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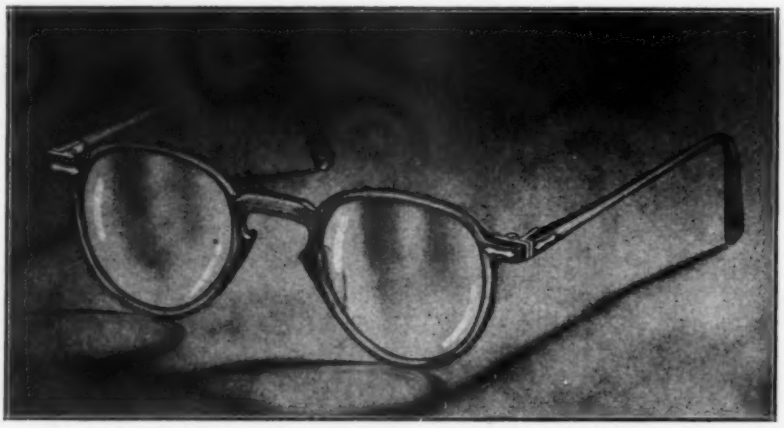

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Vol. 19 — No. 1

CONTENTS

ORIGINAL PAPERS

The Frequency of Vertical Anisometropia. John Claire Kehoe 1

Illumination and Visual Efficiency. Matthew Luckiesh and Frank K. Moss 5

Proximal Convergence and Accommodation. Julius Neumueller 16

EDITORIALS

War Time Ocular First-Aid. Carel C. Koch 26

TRANSACTIONS OF THE ACADEMY. J. Fred Andreae 35

PROCEDURE AND INSTRUMENTATION. G. L. DuPlessis 38

ABSTRACTS 40

CURRENT COMMENTS 46

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. . . and your professional reputation . . .

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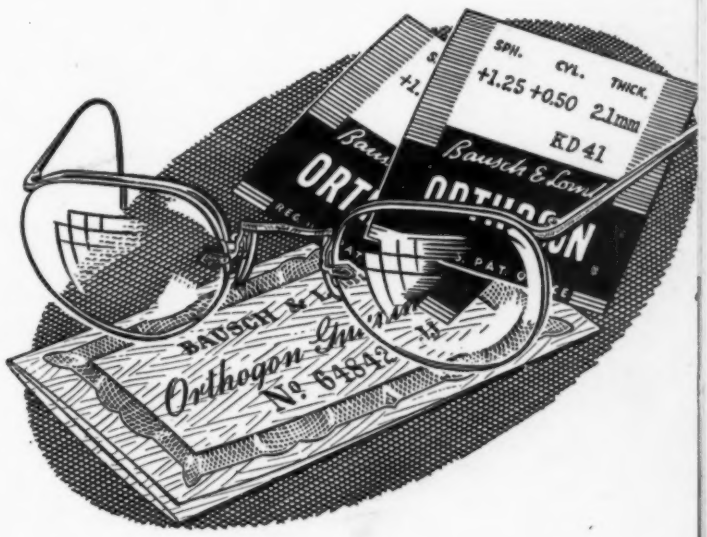

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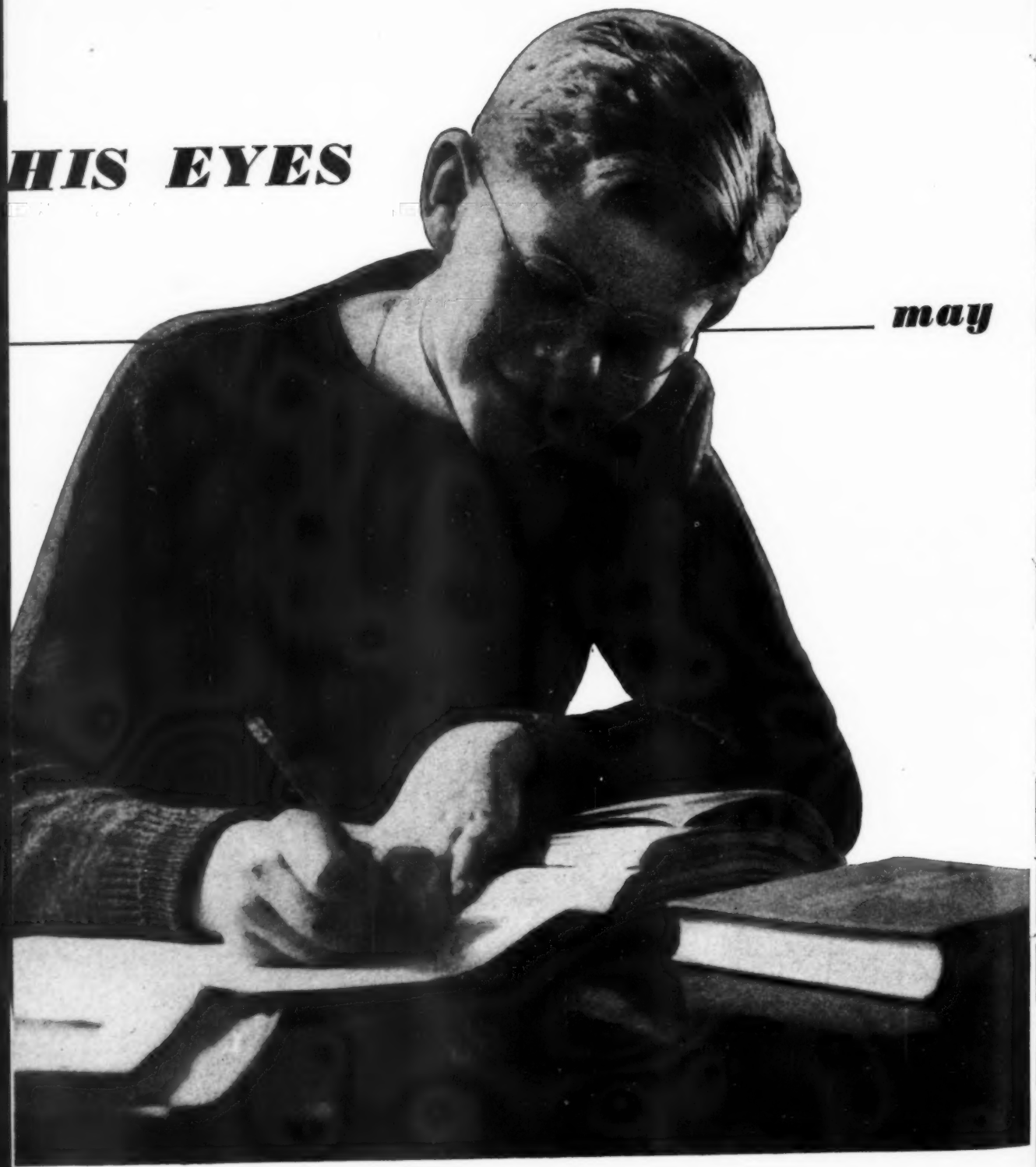

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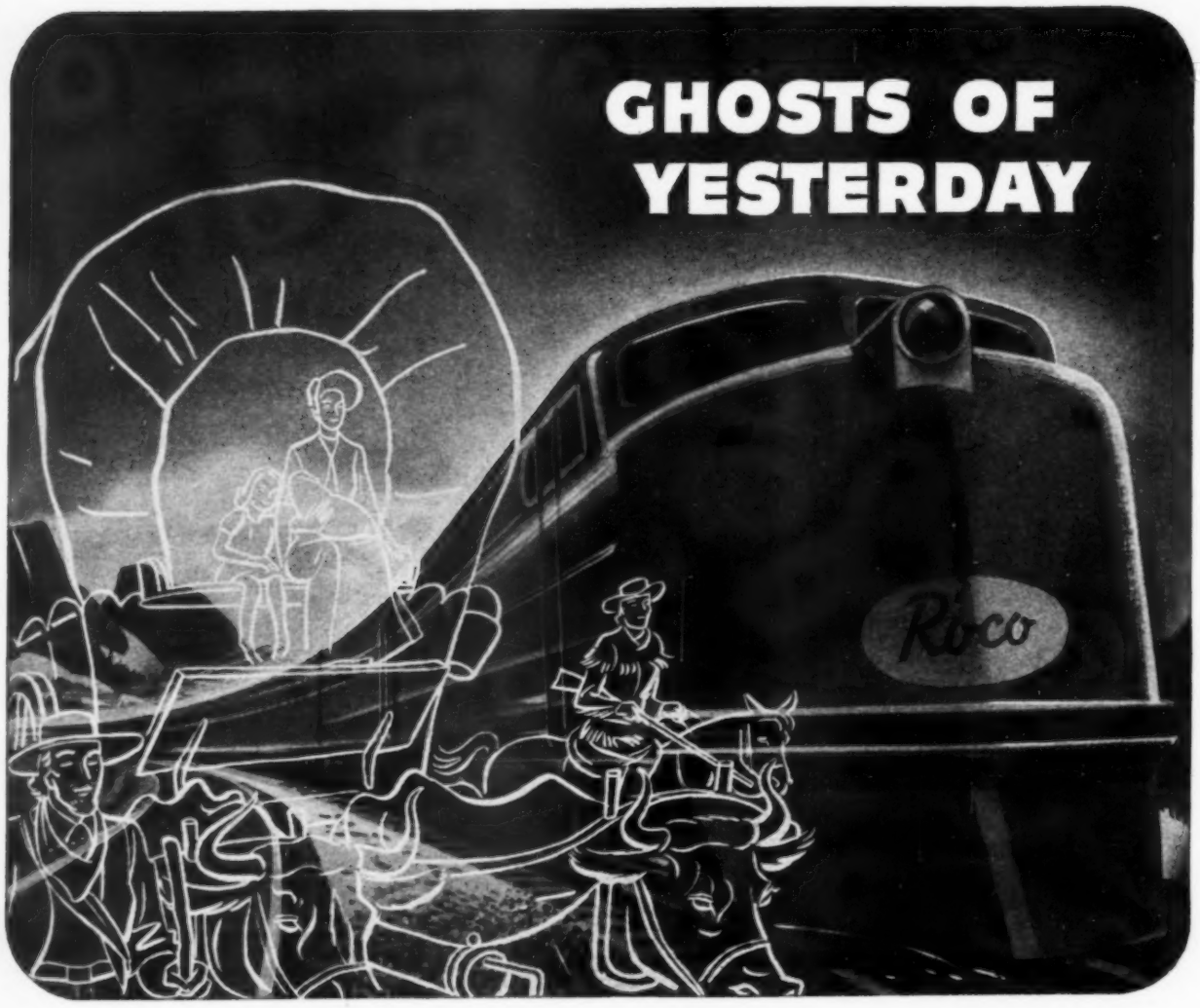

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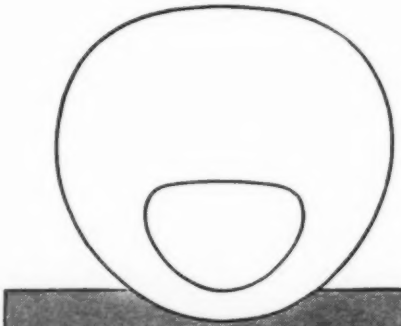

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THE FREQUENCY OF VERTICAL ANISOMETROPIA*

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Lenses used for correcting vertical anisometropia produce an unequal vertical prismatic effects at the reading level. This inequality may, in turn, produce discomfort. It is to the interest of the practitioner to know how frequently vertical anisometropia may be expected to occur, and in what amounts it is generally found.

Donders,[1] Laurance,[2] and others state that generally anisometropia is the rule rather than the exception. This may be true if low amounts of less than .50 D. are considered, but on the whole one might expect a fairly close similarity between the two eyes, since in all animal life there is a tendency for the two sides of the body to be symmetrical.

To demonstrate the frequency with which vertical anisometropia occurs, a thousand cases were selected at random in which a correction for refractive errors had been prescribed. The amount of vertical anisometropia was calculated for each case. Cylinders at oblique axes were resolved into horizontal and vertical components. The total difference in power in the vertical meridians between the two eyes constituted the degree of anisometropia. This calculation was made to the nearest .12 diopter. Frequency distribution curves (Figs. 1 and 2) were constructed from the data obtained in the thousand cases. The abscissae represents amounts of vertical anisometropia. Cases in which there was more plus (or less minus) before the left eye were plotted to the right of the zero ordinate, and cases in which there was more plus (or less minus) before the right eye were plotted to the left. The ordinates represent the frequency of occurrence.

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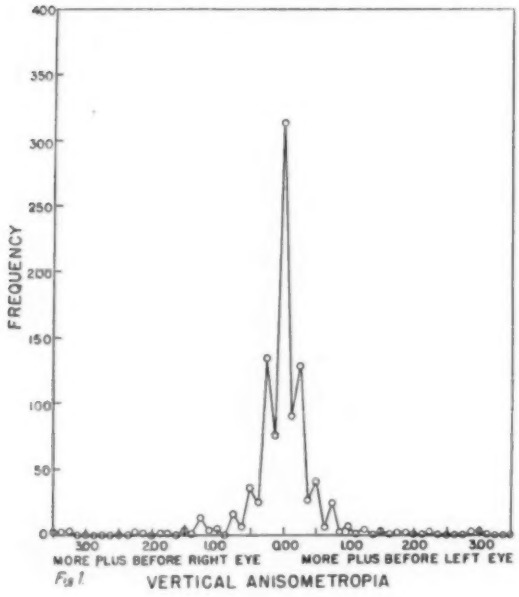

Fig 1

When the cases are grouped for each .12 D. step as in Fig. 1, a saw-tooth curve is obtained. This condition exists because prescriptions are less likely to be written in terms of .12 D. steps than in terms of .25 D. steps. In order to obviate this difficulty in interpreting the data, the cases were grouped to correspond to .25 D. steps (solid line in Fig. 2). This was done by equally dividing the odd .12 D. steps between the adjacent even .12 D. steps. Thus, for example, the cases having .37 D. differences on each side of the zero ordinate were equally divided between the .25 D. and the .50 D. groups. By doing this a much smoother curve is obtained.

A theoretical distribution of the same number of cases, conforming to the properties of a normal curve, having the same standard deviation, is represented by the broken line in Fig. 2.

A comparison of the two curves in Fig. 2 shows that the cases in the empirical distribution are more concentrated around the zero ordinate than would be the case if the distribution were determined by chance factors.

This peculiarity can be attributed to one or both of two factors. Either there is a tendency on the part of the refractionist to equalize the lens corrections before the two eyes, or there is a tendency on the

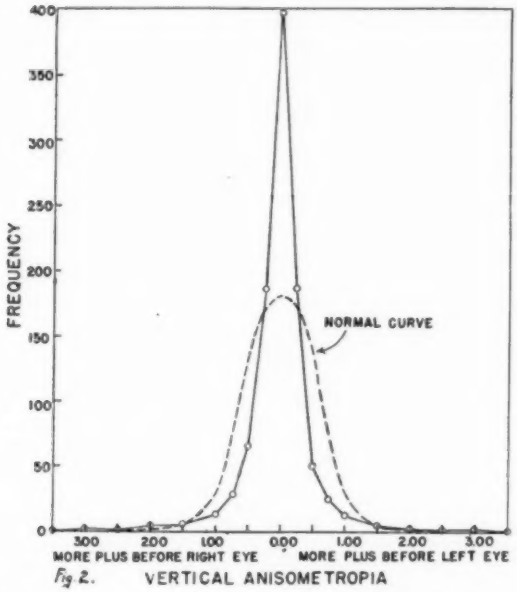

Fig 2. VERTICAL ANISOMETROPIA

part of the subject to compensate for a difference between the two eyes, or a combination of both of these factors.

The mean of the distribution falls at .0055 on the left side of the zero ordinate, and no significant difference is found on the two sides of the zero ordinate. Therefore, it can be said that an excess of plus is just as likely to be required by one eye as the other.

Table I shows the percentage of cases that may be expected to be found with different amounts of vertical anisometropia.

Table II shows the vertical prismatic inequality at reading levels of 8, 10, and 12 mm. below the distance centers for different amounts of vertical anisometropia.

Table I

Amount of Anisometropia	Percent of cases
.50 D. and over	23.1%
1.00 D. and over	7.4%
1.50 D. and over	2.9%
2.00 D. and over	1.6%

Table II

Amount of Anisometropia	Vertical Prismatic Inequality (△). 8 mm.	10 mm.	12 mm.
.50 D.	.40	.50	.60
1.00 D.	.80	1.00	1.20
1.50 D.	1.20	1.50	1.80
2.00 D.	1.60	2.00	2.40

Assuming that one prism diopter and over of vertical inequality at the reading level should receive artificial compensation, this would be necessary in about 7.4 per cent of the cases which enter the office of a refractionist. If such compensation were limited to cases with 2 prism diopters and over, it would be necessary in only 1.6 per cent of all cases.

Appreciation is expressed to the *Univis Lens Company* for a Fellowship which has made possible the work described above.

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1. Donders, F. C., "The Anomalies of Accommodation and Refraction," p. 557, 1866.

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ILLUMINATION AND VISUAL EFFICIENCY*

Matthew Luckiesh and Frank K. Moss
Lighting Research Laboratory
General Electric Company
Nela Park, Cleveland

The achievement of a favorable lighting environment for the performance of work-world tasks involves an adequate consideration of (1) quantity of light or footcandles, (2) the distribution of the light and (3) the spectral character of the light.[1] These factors are universally controllable—a characteristic not associated with other aids to seeing. Obviously they describe the character of the link between the visual mechanisms and the objects to be seen or visual task to be performed. With present-day illuminants, the factor of spectral character is generally the least important excepting in situations involving critical color discrimination. Thus quantity and distribution of light may be considered as the controllable factors in lighting practice. The present discussion is concerned largely with the factor of quantity of light—it being assumed, in all cases, that the *quality of the lighting* is proper. This emphasis upon "footcandles" is warranted in view of the prevalence of low levels of illumination throughout the work-world and in consideration of the marked effectiveness of illumination as an aid to seeing.

Visibility and Ease of Seeing. Every problem of seeing, including the specification of recommended levels of illumination, eventually involves two viewpoints. One of these views the eyes and the visual processes merely as means for the subjective recognition of objects of the external physical world. Hence it is important to measure the "visibility" of objects to be seen. The other views seeing as a complex activity of the human being involving not only the abilities and limitations in

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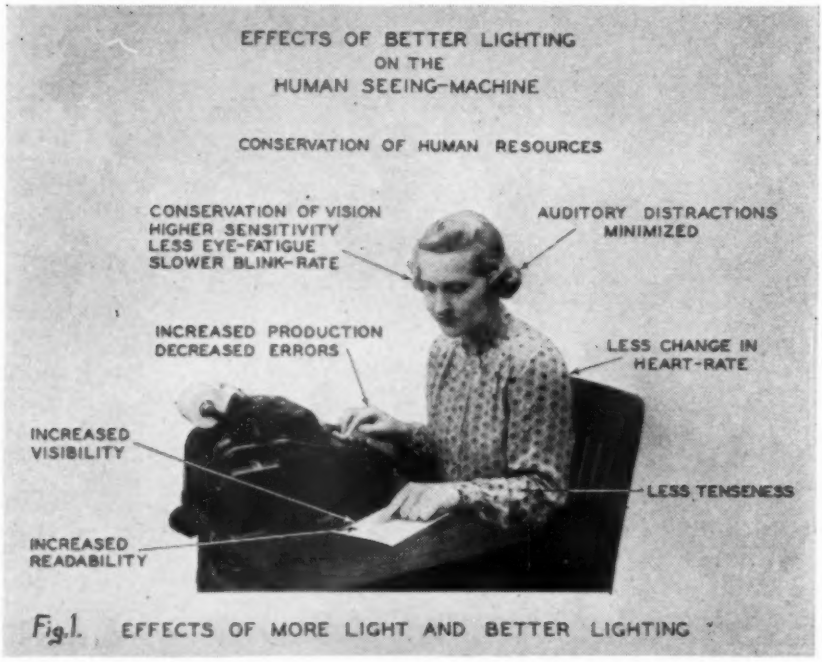

Fig. 1—Indicating the effects of more light and better lighting upon vision, ease of seeing and production of useful work.

seeing but also the consequences of seeing upon the efficiency and welfare of the individual. Hence it is likewise important to appraise ease of seeing. Some of these considerations, as they are influenced by light and lighting, are indicated in Fig. 1. Actually, all of the depicted responses or effects have been studied extensively by the authors.[1] It should be obvious from this pictorial summary that seeing is more than visual function; and that the basis for recommending desirable levels of illumination is an involved one.

The data of Fig. 2 summarize, from a quantitative viewpoint, the influence of illumination upon (1) the efficiency of the eyes as optical devices as appraised by brief measurements of functions such as visual acuity and contrast sensitivity and (2) upon ease of seeing as appraised by certain psychophysiological effects of seeing such as tenseness and ocular muscle fatigue. It is obvious from the concordance among these diverse criteria that the favorable influences of illumination upon visual efficiency and upon ease of seeing extend to levels of illumination higher than 100 footcandles and to brightness-levels encountered outdoors in

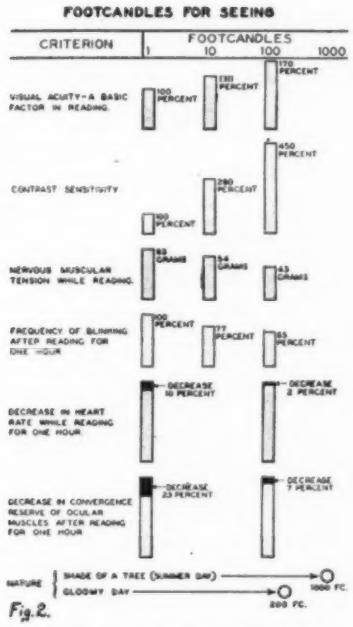

Fig. 2—A quantitative summary of results of extensive researches which reveal the influence of illumination upon important aspects of visual efficiency and upon even more important effects of seeing. Researches dealing with these and other effects are revolutionizing the viewpoint from barely seeing to easy seeing.

the daytime. Furthermore, since the backgrounds in all cases were white surfaces, the foregoing conclusion is equivalent to stating that increased beneficial visual effects are obtained for brightness-levels at least as high as 100 footlamberts. This would be equivalent to several hundreds of footcandles on many objects which reflect far less light than does a white surface.

Footcandle Scale of Effectiveness. It will be noted from Fig. 2 that the illumination must be increased in geometric steps to obtain arithmetic increases in the measured visual effect. In other words, the "footcandle" as a unit diminishes in effectiveness as the level of illumination is raised just as a "minute visual angle" as a unit decreases in effectiveness as the size of the object of regard is increased. It will also be noted that this geometric relationship between illumination and its effects is revealed by criteria of "visibility" as well as by criteria of "ease of seeing." Similar relationships between stimulus and sensation are commonly encountered throughout the realm of sensory physiology. This is an unassailable fact which did not permeate far into considerations of light

and lighting until recently when it has been revealed and emphasized in many ways by the science of seeing. It is a characteristic of visual response which often leads to naive conclusions. For example, the statement is not infrequently made that significant improvements in seeing are not obtained for levels of illumination higher than some arbitrarily conceived value. The latter conclusion is usually a result of a confused compromise between economic factors and visual benefits. Obviously, the conclusions derived from researches relating illumination, visibility and ease of seeing are in no way related to economic factors. The latter become involved only when the recommended levels of illumination or of brightness are specified for specific visual tasks.

If the ability and performance of the human seeing-machine were constant, the effects of changes in illumination would be more readily revealed. However, the effectiveness of the visual processes varies with the lighting environment due to the processes of retinal and pupillary adaptation. It also varies from moment to moment due perhaps to involuntary fluctuations of the "focus" of the eyes and of the attention, and to other human vagaries. Analyses of the magnitudes of such compensations and fluctuations, as well as introspective appraisals of visibility and ease of seeing, lead to the conclusion that the level of illumination must be approximately doubled to produce an *obvious* and *significant* improvement in seeing. This becomes a cardinal principle in consideration of footcandle recommendations and Fig. 3 is a graphic illustration of it. This does not mean that one footcandle added to 10 footcandles, for example, will have no influence on seeing; but rather that its influence will be small or even undetected by the unaided human seeing-machine.

Our researches relating level of illumination and ease of seeing have generally been confined to the range from one to 100 footcandles. This is equivalent to six successive steps on the footcandle scale of effectiveness represented in Fig. 3. These may be regarded as successive steps toward ideal lighting from the viewpoint of ease of seeing. If a given visual situation is to be improved through the use of a higher level of illumination, it follows that at least one step is essential; others are desirable but may not be recommended in certain cases, due to factors of cost, installational difficulties, past practices, etc.

Work - World Tests. Laboratory researches have established as a fact that the visual processes become more efficient and that seeing becomes easier as the illumination is increased beyond 100 footcandles

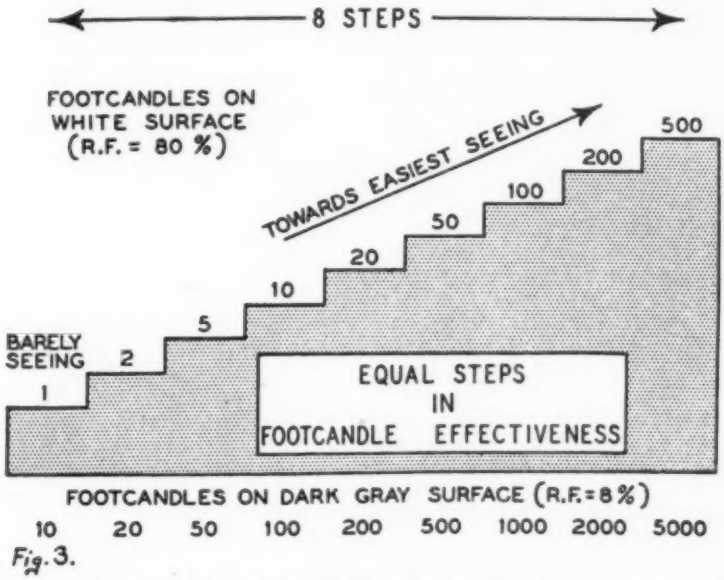

Fig. 3—Illustrating the scale of footcandle effectiveness. Numerous and diverse researches have established the fact that the illumination (footcandles) must be approximately doubled to produce equal and significant improvements in seeing. Obviously, the reflectance of the illuminated surface must be considered in specifying recommended levels of illumination. For example, a surface having a reflectance of 80 per cent and illuminated with 10 footcandles will be equal in brightness to a surface having a reflectance of 8 per cent and illuminated with 100 footcandles.

for ordinary visual tasks. Therefore it is of practical importance to determine whether these effects of more light and better lighting are capable of increasing and improving the performance of work-world tasks which are influenced by innumerable non-visual factors. Many so-called practical tests have been conducted for this purpose.[2] Among these, two recent, extensive and well-controlled investigations will be cited. One of these pertains to the influence of higher levels of illumination upon the rate of producing useful work, and the other upon the influence of more light and better lighting upon the educational progress of school-children, or more broadly, upon mental achievement.

The performance of everyday seeing tasks under ordinary conditions for *extended* periods often reveals the benefits of improved visual conditions. For example, the data of Fig. 4 show the increase in production and decrease in errors in a statistical operation known as key-punching resulting from an increase in the level of illumination upon the work from 8 to 60 footcandles and a change in the position of the copy with respect to the machine so that it could be read with the least

deviation of the eyes from their normal or primary positions. It will be noted from Fig. 4 that production began to increase and errors diminish somewhat latently after the installation of the new equipment. It is also of particular interest to note that these measures of performance did not reach their optimum values until about 18 months after the conditions for seeing were improved.

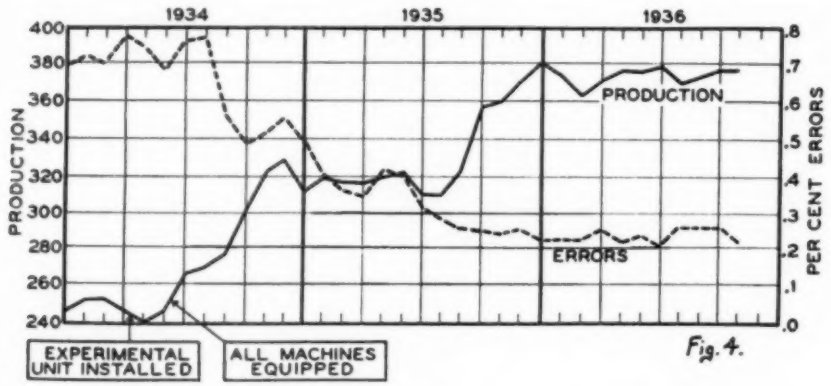

Fig. 4—Showing the increase in production and the decrease in errors, respectively, which followed the installation of supplementary lighting units upon business machines.

This investigation emphasizes the complex nature of human behavior with respect to environmental changes. In fact, it would be rather naive to assume that the mechanical and visual habits of the individual, acquired from years of training, would necessarily be immediately altered by changing the visual conditions under which the work is done. Similarly, it often takes some time for a patient to become accustomed to properly prescribed eyeglasses. The fact that the improvement in the performance of the key-punching task was slight even after a month of work under the obviously improved conditions is evidence of the unreliability and inadequacy of so-called "production tests" of short duration.

The data presented in Fig. 5 indicate the influence of classroom lighting upon the educational progress of pupils in the fifth and sixth grades as determined by a rigorously controlled three-year research.[3] Identical classrooms were selected for test-purposes and were decorated and furnished alike. In the "control" rooms, the original lighting was retained and maintained. The lighting of the "experimental" rooms was the best attainable in practice at the time. In general, it was superior to that of the control rooms in three fundamental respects: (1) in level

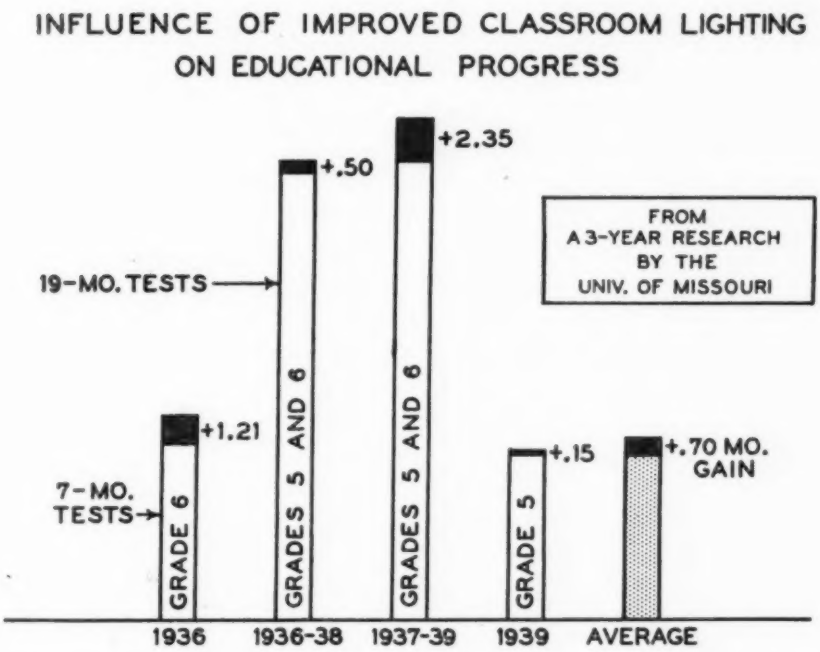

Fig. 5—The influence of improved classroom lighting on educational age as determined with four test-groups. The gains in educational age made in the well-lighted classrooms are indicated by the solid blocks; and the duration of the test-periods by the open blocks.

of illumination, (2) in maintenance of a given level of illumination during the day and (3) in the reduction of preventable glare.

The two groups of pupils were balanced with the utmost care on the basis of educational age, educational quotient, chronological age, mental age, and intelligence quotient. In addition, each pupil was given a complete ocular examination and the two groups were reconsidered in the light of these data. Since human mentalities, personalities, emotions and behavior are so complex, it can never be really known when two groups are completely balanced. Obviously, groups can be balanced on certain criteria and yet be unbalanced on other factors. In the present research, the criteria were not only checked against several so-called balanced groups of different sizes in each grade which were balanced on different criteria, but case studies of individual pupils were also made. As a result of these procedures, excellent degrees of balance were obtained

throughout the experiment insofar as this characteristic is discernible from statistical and clinical data.

The results of this extensive and well-controlled research show that improved lighting definitely and significantly accelerates educational progress. It will be noted that the actual gain in educational age of the pupils in the well-lighted rooms exceeded that of the pupils in the poorly-lighted rooms by 10 per cent. However, in the present state of school lighting in which low levels of illumination often prevail, the fact that a decisive gain in educational progress was obtained by a reasonable and practical improvement in lighting appears to be of greater importance than the exact magnitude of the educational gain.

Techniques of Measurement. During our studies in the science of seeing which have extended over about a quarter of a century, we have tested many existing visual criteria and have developed a number of new ones. For studies of visibility, as the latter attribute of objects is influenced by such factors as size, form, contrast and brightness, some type of a "visibility meter" appears to be essential. Such an instrument is illustrated in Fig. 6. It consists essentially of two identical colorless circular gradient filters, precise in optical density and diffusion, which may be rotated synchronously in front of the eyes of the observer while binocularly viewing an object or while performing a visual task.[4] These filters incidentally reduce the apparent brightness of the visual field by absorption but of more importance, they reduce the degree of contrast

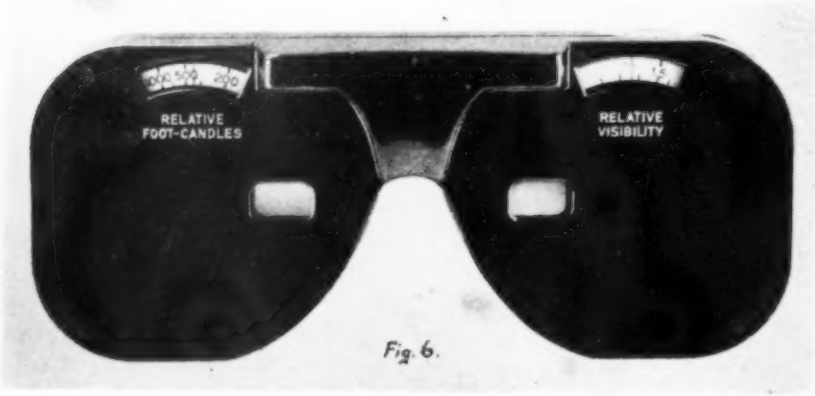

Fig. 6—The Luckiesh-Moss Visibility Meter. A new instrument for appraising the visibility of various objects or visual tasks, and for specifying relative levels of illumination for various visual tasks upon a rational basis.

between the object of regard and its background, due to the slightly diffusing character of the photographic filters. Thus threshold conditions are established by rotating the gradient filters until the object of regard just emerges from, or disappears into invisibility; that is, into the obscurity of the blurred visual field.

In developing a scale of visibility, it is recognized that the specification of a unit of visibility is an arbitrary matter. However, this is equally true of such other units as the meter, gram, decibel, lambert, etc. The fact that a unit of visibility necessarily involves many arbitrary specifications does not lessen its practical usefulness. For example, the unit of visual acuity, as used in rating human vision, involves all of the variables present in the specification of unit visibility as applied to objects. However, many of these variables disappear when visibility is measured upon a relative basis. This is true for the two scales of the L-M Visibility Meter. One of these scales (Relative Visibility) is calibrated in terms of the visual size of standard test-objects which are just visible through various regions of the gradient filters. The other scale (Relative Footcandles) is calibrated in terms of the illumination required upon a standard test-object (8-point type) to cause it to be visible through various regions of the filters. Thus this scale indicates the footcandles necessary to make any object or task as visible as the 8-point type is under 10 footcandles—a very conservative level of illumination for reading 8-point type. The calibration of these scales and their visual significance is discussed in detail elsewhere.[4]

The most sensitive and significant criterion for appraising ease of seeing appears to be the rate of involuntary blinking while performing a given task under different visual conditions.[5] Some of our data obtained with this criterion are presented in Fig. 7. These data, and others, show that the rate of blinking is invariably increased when the task is made more difficult in various ways. The significance of the relationship between rate of blinking and ease of seeing is also augmented by the fact that no differences in blink-rate have been observed for tasks of equal visual difficulty as appraised by other significant criteria. Furthermore, the criterion of blinking, when used under proper experimental conditions, appears to be unusually sensitive since reliable differences result from reasonable alterations in the conditions under which the tasks are performed. By means of numerous investigations it has been shown that reproducible results are obtainable, even for small changes in the

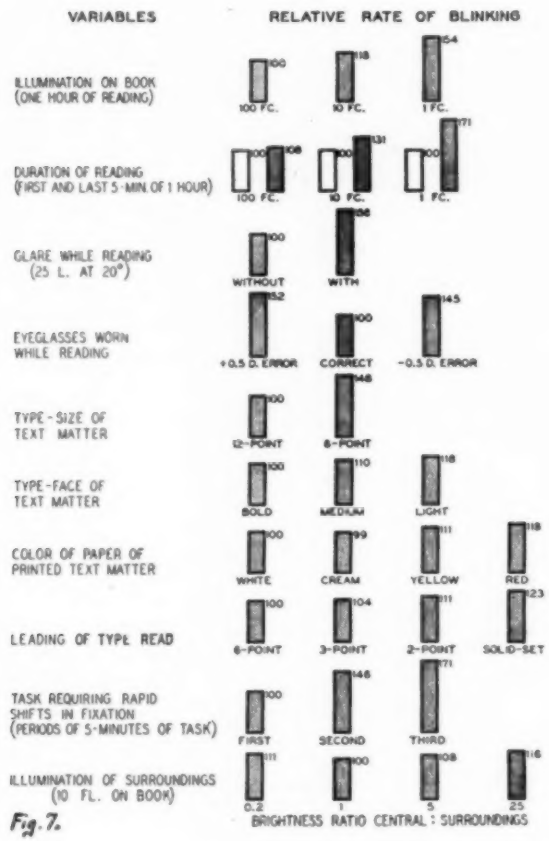

Fig. 7—Changes or differences in the rate of involuntary blinking while reading under various visual conditions.

task, when the experimental procedures are carefully controlled and an adequate number of observations are made with a reasonable number of subjects of no noticeable eccentricities. In addition to the laboratory investigations reported herein, we have applied the criterion of rate of blinking in appraising several actual lighting installations. The results obtained in a few relatively brief tests were consistent with the appraisals made by the workers themselves after extended periods of work under these environments. With the establishment of this criterion as indicated in this summary many applications can be made to lighting and other every-day conditions of seeing involving brightness and its distribution.

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PROXIMAL CONVERGENCE AND ACCOMMODATION*

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Since the beginning of ocular refraction efforts have been made to design and construct a small self-contained refraction machine. Surely every practitioner would prefer such a compact refraction instrument to a 20-foot refracting room. This ready market induced the construction of a number of instruments, optometers and refractometers, presumably allowing to perform a subjective or objective refraction for any distance by simply moving optically the test target. European practitioners, very conscious of ingenious optical designs, have time and again taken kindly to such instruments, written a few glowing reports but in the course of a few years the instruments disappeared from the market. The cause of this failure was invariably the over-correction in minus and the under-correction in plus power as indicated by these instruments which violate the fundamental refraction law of "as much plus or as little minus as consistent with comfortable and good vision."

It is now generally conceded that a refraction test in order to render reliable data must be performed at the spatially correct distance and that no optical substitution for this distance is permissible. The reason is that the knowledge or sense of the spatial proximity gives rise to proximal convergence and accommodation, thus yielding wrong lateral heterophoric and ametropic findings. After the use of such apparatus for exact refraction had to be abandoned, it was tried to resurrect them at least for screening devices in the form of a stereoscope and special cards. Recently, however, even its value for screening out normal from abnormal cases has come to be doubted and so the whole problem of proximal convergence and accommodation is quite acute and timely.

Today's presentation does not exhaust the problem; particularly

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not as far as the accommodative factor is concerned. Almost all of the subjects either wore the true correction or needed none so that accommodative spasms were in evidence in isolated cases only. It is our intention to make a stereoscopic pre-examination test on every refraction case during the next year in order to determine the extent of proximal accommodation in latent hyperopic cases.

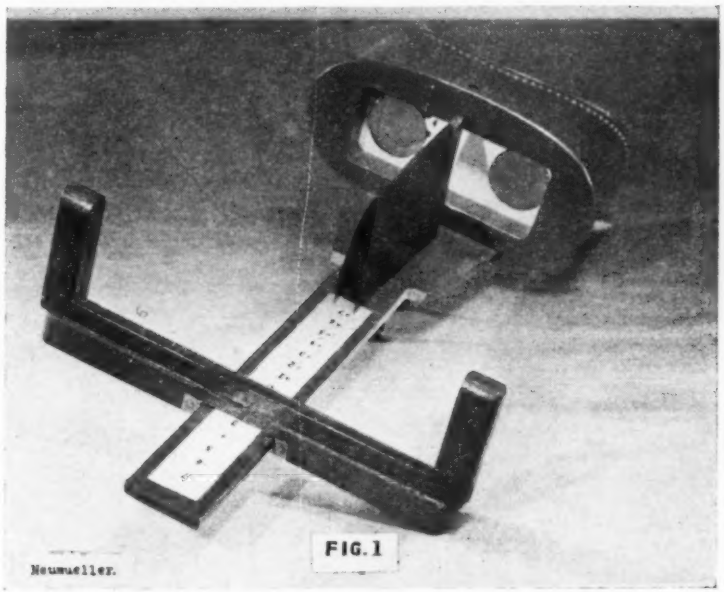
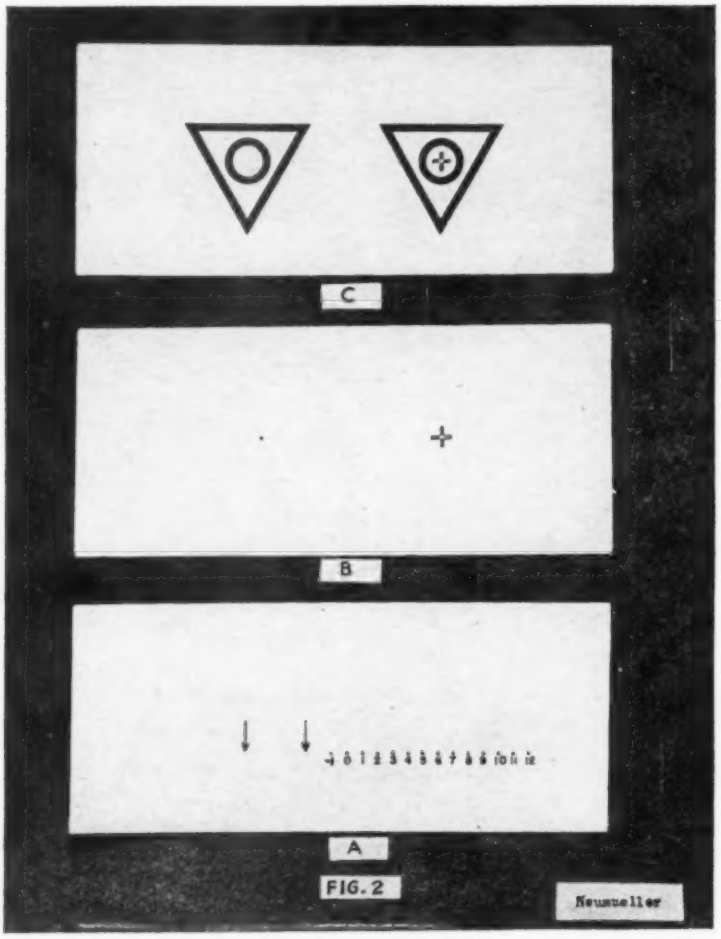


FIG. 1

The instrumentation for our investigation is of the simplest kind. (Fig. 1.) From a stock stereoscope we removed the prism lenses and replaced them with a pair of +5.00 D. test lenses with optical centers 64 mm. apart. A millimeter scale with the zero mark at 200 mm. from the +5.00 D. lenses was pasted onto the tongue of the stereoscope. This scale was marked from the zero point in plus numbers (centimeters) towards the stereoscope and minus numbers in the opposite direction. The septum of the stereoscope was augmented if necessary by a black paper rider fastened by means of bee's wax. (See Fig. 1.)

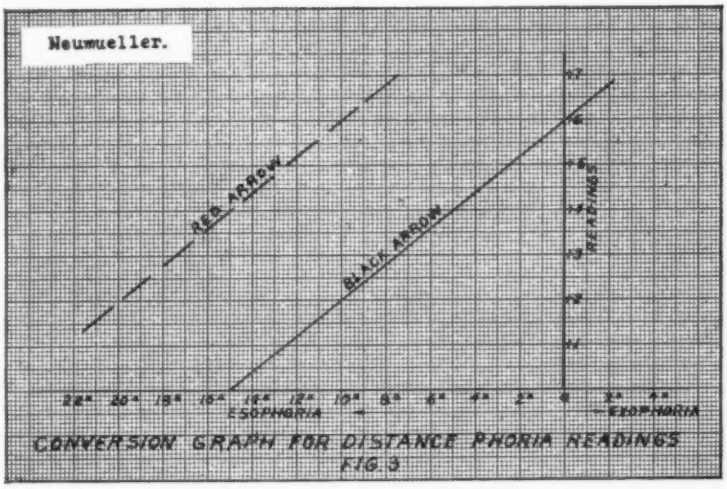
Three cards (Fig. 2) were designed to be used in connection with the test. The phoria card (Fig. 2A) carries a phoria scale on the right side and two arrows, one black and one red, on the left side. The red arrow was found necessary for extreme esophoria readings. As the distance between the black arrow and number 6 equals the distance between

the optical centers of the +5.00 D. compensating lenses (64 mm.), any pair of eyes with visual axes parallel will see the black arrow point to 6 when the card is in the focal plane of the +5.00 D. lenses. The scale of the card in the distance position is calculated so that each unit is equivalent to 2½ △. (See Fig. 3.)



For the measurement of near point phorias the card was positioned so that it was imaged at 330 mm. (13 inches) from the principal plane of the eye, which is equivalent to about 343 mm. from the ocular center of rotation. The phoria values of the near point readings depend upon the pupillary distance on account of the prismatic effect of the +5.00 D. lens. These values were calculated and are given in the

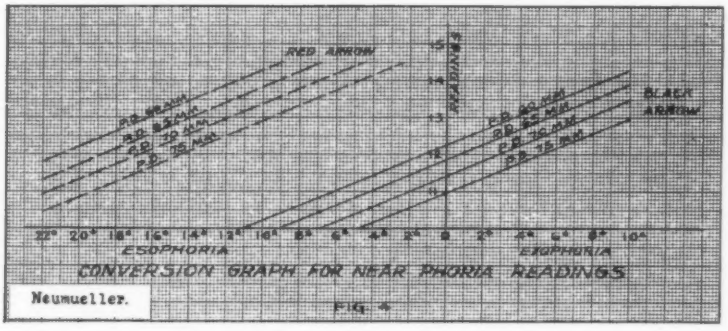
conversion graph for near phoria readings (Fig. 4). The prismatic effect introduced by the correction lenses with spectacle wearing subjects was disregarded.



CONVERSION GRAPH FOR DISTANCE PHORIA READINGS
FIG 3

The conventional phoria tests were performed by means of dissociation technique with test object at 20 feet and 333 mm. from the principal point of the eye respectively.

The accommodation tests were performed by means of cards (2B and 2C). Card 2B is for giving a purely monocular visual discrimina-

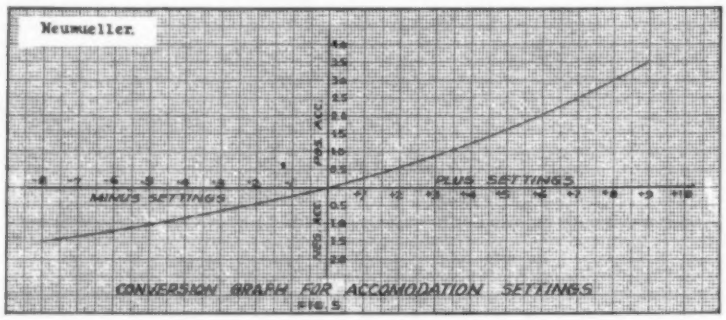


tion test, while card 2C is designed for a monocular visual discrimination test while maintaining single binocularity for distance. Quite some experimental work was devoted to the design of extremely small targets commensurable with the foveal minute angle discrimination. Prac-

tical tests proved that such an exact design is totally superfluous and we then accepted the design shown in 2B and 2C.

The technique of the test for proximal accommodation was as follows:

The patient's vision was tested monocularly either with or without glasses, as the case may have been, and the blurring lens was determined. In some cases a temporary auxiliary weak correction was given and worn during the test in order to bring the blur point within the range of a +0.25 D. Some of the younger non-spectacle wearing subjects (Ss. Nos. 13, 14 and 20) were refracted afterwards in order to determine their latent ametropia.



The test card 2B with the target before the right eye was then placed well within the subject's range of clear vision and he or she was told to study it and particularly to pick a fine detail for discrimination. The holder was then withdrawn beyond the zero mark into the blur zone and brought slowly in until the subject signified that the chosen fine detail was seen clearly. This procedure was repeated three times and then reversed coming from clear vision to blur. The data were found to be highly accurate and reliable, the scattering of 3 equivalent readings being never more than 3 mms. or about 0.06 D. The same procedure was then followed in testing the left eye.

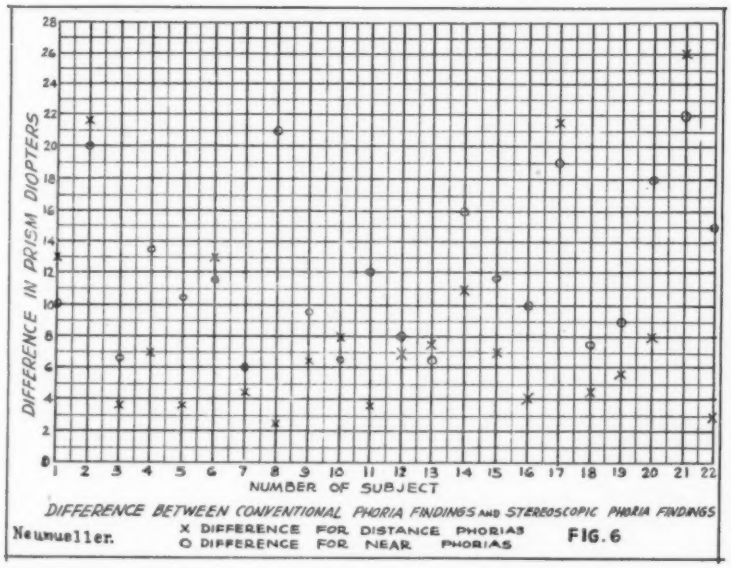
Test card 2C was used in identically the same manner as test card 2B. Some subjects had difficulty attaining single binocularity, but by directing them to look over the card and then gradually drop the gaze to the test object all subjects obtained and maintained single binocularity during the test.

The scale readings were converted into positive or negative accom-

modation diopters applied at the principal point of the eye by means of the conversion graph shown in Fig. 5.

The card holder was operated throughout the test by the tester and not by the testee.

Table I lists the conventional phoria findings versus the stereoscopic phoria findings and graph Fig. 6 shows the difference between


DIFFERENCE IN PRISM DIOPTERS
NUMBER OF SUBJECT
DIFFERENCE BETWEEN CONVENTIONAL PHORIA FINDINGS AND STEREOSCOPIC PHORIA FINDINGS
Neumueller.
X DIFFERENCE FOR DISTANCE PHORIAS
O DIFFERENCE FOR NEAR PHORIAS
FIG. 6

these two values (a $\times$ for distance and an O for near). In studying these data we see that:

1. Every subject showed a good deal more convergence with the stereoscopic test than with the conventional phoria test. The minimum difference for distance between the data of these two tests is $2\frac{1}{2}\triangle$ while the maximum is $26\triangle$. The minimum and maximum differences for near are $6\triangle$ and $22\triangle$. (See Fig. 6.)

2. There is absolutely no correlation between these differences and the age of the subject.

3. The scattering of the data is very wide and one cannot talk about an average. One can therefore not foretell the stereoscopically found phorias from the conventional phoria findings. The two findings do not at all follow a fixed pattern and are totally unrelated one to

the other. Proximal convergence seems to be a highly individual reaction.

All these facts point out definitely that a stereoscopic card device cannot be used for the measurement of phorias.

NO.	SUBJECT	SEX	AGE	CONVENTIONAL PHORIA FINDING		STEREOSCOPIC PHORIA FINDING		REMARKS
				DISTANCE	NEAR	DISTANCE	NEAR	
1	H.K.	F	24	$\frac{1}{2}^{\Delta}$ ES.	$\frac{1}{2}^{\Delta}$ ES.	$13\frac{1}{2}^{\Delta}$ ES.	$10\frac{1}{2}^{\Delta}$ ES.	CORRECTED HIGH MYOPIA
2	C.L.F.	M	20	$1\frac{1}{2}^{\Delta}$ EX.	$7\frac{1}{2}^{\Delta}$ EX.	20^{Δ} ES.	$12\frac{1}{2}^{\Delta}$ ES.	R+.25. L+.50 TEMPORARY
3	P.B.	M	37	$\frac{1}{2}^{\Delta}$ EX.	$6\frac{1}{2}^{\Delta}$ EX.	3^{Δ} ES.	0^{Δ}	CORRECTED WEAK HYPEROPIA
4	E.C.	M	30	0^{Δ}	$\frac{1}{2}^{\Delta}$ EX.	7^{Δ} ES.	13^{Δ} ES.	CORRECTED HIGH MYOPIA
5	J.B.M.	M	24	0^{Δ}	4^{Δ} EX.	$3\frac{1}{2}^{\Delta}$ ES.	$6\frac{1}{2}^{\Delta}$ ES.	CORRECTED MED. HYPEROPIA
6	A.L.	M	28	$1\frac{1}{2}^{\Delta}$ EX.	4^{Δ} EX.	$11\frac{1}{2}^{\Delta}$ ES.	$7\frac{1}{2}^{\Delta}$ ES.	NO GLASSES
7	R.F.	M	25	3^{Δ} EX.	$14\frac{1}{2}$ EX.	$1\frac{1}{2}^{\Delta}$ ES.	$8\frac{1}{2}^{\Delta}$ EX.	UNDERCORRECTED HYPEROPIA
8	J.M.W.	M	36	4^{Δ} EX	4^{Δ} EX.	$1\frac{1}{2}^{\Delta}$ EX.	17^{Δ} ES.	CORRECTED MED. HYPEROPIA
9	R. Mac A.	M	21	$\frac{1}{2}^{\Delta}$ ES.	$1\frac{1}{2}^{\Delta}$ EX.	7^{Δ} ES.	8^{Δ} ES.	NO GLASSES
10	H.C.	M	29	1^{Δ} EX.	7^{Δ} EX.	7^{Δ} ES.	$\frac{1}{4}^{\Delta}$ EX.	NO GLASSES. LATENT HYPEROPIA
11	W.T.	M	25	0^{Δ}	6^{Δ} EX.	$3\frac{1}{2}^{\Delta}$ ES.	6^{Δ} ES	UNDERCORRECTED MYOPIA
12	L.H.	M	28	$4\frac{1}{2}^{\Delta}$ EX.	11^{Δ} EX.	$2\frac{1}{2}^{\Delta}$ ES.	3^{Δ} EX.	LATENT HYPEROPIA
13	D.M.	M	18	0^{Δ}	10^{Δ} EX.	$7\frac{1}{2}^{\Delta}$ ES.	$3\frac{1}{2}^{\Delta}$ EX.	LATENT HYPEROPIA
14	B.T.	F	24	$\frac{1}{2}^{\Delta}$ EX.	$6\frac{1}{2}^{\Delta}$ EX	$10\frac{1}{2}^{\Delta}$ ES.	$9\frac{1}{2}^{\Delta}$ ES.	LATENT HYPEROPIA
15	H.J.	M	18	$2\frac{1}{2}^{\Delta}$ EX.	2^{Δ} ES.	$4\frac{1}{2}^{\Delta}$ ES.	$14\frac{1}{2}^{\Delta}$ ES.	LATENT HYPEROPIA
16	E.M.	M	18	1^{Δ} EX.	1^{Δ} EX.	3^{Δ} ES	9^{Δ} ES	UNCORRECTED ASTIGMA. NO GLASSES
17	A.G.	M	17	0^{Δ}	$2\frac{1}{2}^{\Delta}$ ES.	$21\frac{1}{2}^{\Delta}$ ES.	$21\frac{1}{2}^{\Delta}$ ES.	NO GLASSES
18	W.H.	M	18	1^{Δ} ES.	$5\frac{1}{2}^{\Delta}$ ES.	$5\frac{1}{2}^{\Delta}$ ES	13^{Δ} ES	NO GLASSES
19.	H.K.	M	18	2^{Δ} EX.	0^{Δ}	$3\frac{1}{2}$ ES	9^{Δ} ES	NO GLASSES
20	W.T.	F	18	1^{Δ} ES.	3^{Δ} EX.	9^{Δ} ES.	15^{Δ} ES.	UNCORRECTED WEAK HYPEROPIA
21	R.J.B.	M	30	4^{Δ} EX.	5^{Δ} EX.	22^{Δ} ES.	17^{Δ} ES.	UNCORRECTED WEAK HYPEROPIA
22	R.H.	M	24	0^{Δ}	5^{Δ} EX	3^{Δ} ES.	10^{Δ} ES	UNCORRECTED WEAK HYPEROPIA

CONVENTIONAL PHORIA FINDINGS vs. STEREOSCOPIC PHORIA FINDINGS.
Neumueller.

TABLE I

Table II contains the data for the accommodation settings with the stereoscopic card. A study of these data brings out the following points:

1. The accommodation is not nearly as highly influenced as the convergence by the proximity of the test target.

2. Coming from blur to clearness seems to incite more accommodation than coming from clear to blur. The reason possibly is that the subject makes an effort to clear up the blurred image and the result is accommodation. The difference between these two data cannot be explained by a "hanging over." Careful and slow motion of the test target has pointed out definitely that there is another factor involved.

3. The difference between accommodation settings with fusion and without fusion is not very striking except in spasm cases such as subjects Nos. 10, 13 and 14. As mentioned before, this group of subjects is not properly chosen for investigating this particular factor be-

cause they all have either worn glasses for a long time or have been considered emmetropes.

4. Very interesting is the case No. 12, L.H. He is a pseudo-myope who was fitted with minus lenses until about one month ago. He was then re-examined and fitted with his basic correction which blurs him

ACCOMMODATION SETTINGS WITH STEREOSCOPIC CARD
TABLE 2

NO.	NAME	SEX	AGE	V.A.	BLURS WITH	ACCOMMODATION SETTINGS WITHOUT FUSION			ACCOMMODATION SETTINGS WITH FUSION			DIFFERENCES IN PRISMA DIOPTERS	REMARKS
						20/XX IN 30 CM.	IN 20 CM.	ACC. D	20/XX IN 30 CM.	ACC. D	ACC. D	DISTANCE / NEAR	
1	H.K.	F	24	R 20/20	+.25	R+1.0	+0.50	+0.4	R+0.3	+0.10	R+0.3 +0.10 +0.1	13° / 10°	CORRECTED HIGH MYOPIA
				L 20/15	+.25	L+2.4	+0.90	+0.7	L+2.4	+0.10	L+0.3 +0.10 +0.1		
2	C.L.F.	M	20	R 20/15	+.25	R+1.5	+0.15	R+0.8	+0.30	+0.2	R+1.3 +0.35 R+0.1 +0.05 +0.2	21¼° / 20°	WORE R+.25 L+.50 FOR TEST
				L 20/15	+.25	L+1.1	+0.30	L+1.1	+0.30	+0.3	L+2.4 +0.10 +0.2		
3	P.B.	M	37	R 20/15	+.25	R+1.0	+0.25	R+1.0	+0.25	+0.25	R+0.1 +0.05 R+0.2 +0.05 +0.05	3½° / 6½°	CORRECTED WEAK HYPEROPIA
				L 20/15	+.25	L+0.6	+0.15	L+1.1	+0.30	+2.5	L+0.2 +0.05 L+0.2 +0.05 +0.05		
4	E.C.	M	30	R 20/15	+.25	R+0.7	+0.20	R+0.20	R-0.2	-0.05	R-0.3 -0.10 -0.05	7° / 13½°	CORRECTED HIGH MYOPIA
				L 20/15	+.25	L+0.4	+0.10	L+0.3	+0.10	+0.10	L 0.0 0.0 +0.02		
5	J.B.M.	M	24	R 20/15	+.25	R+0.4	+0.10	R 0.0	0.0	+0.05	R-0.2 -0.05 R-0.2 -0.05 -0.05	3½° / 10½°	CORRECTED MEDIUM HYPEROPIA
				L 20/15	+.25	L+0.7	+0.20	L-0.1	-0.05	+0.10	L-0.2 -0.05 L 0.0 0.0 -0.03		
6	A.L.	M	28	R 20/15	+.25	R+0.1	+0.05	R-0.1	-0.05	0.0	R-0.4 -0.10 R-0.4 -0.10 -0.10	13° / 11½°	NO GLASSES
				L 20/15	+.25	L 0.0	0.0	L 0.0	0.0	0.0	L-0.5 -0.10 L-0.4 -0.10 -0.10		
7	R.E.	M	25	R 20/15	+.25	R+1.5	+0.40	R+1.3	+0.35	+0.35	R+0.8 +0.20 R+0.7 +0.20 +0.25	4½° / 6°	UNDERCORRECTED HYPEROPIA
				L 20/15	+.25	L+0.6	+0.15	L+0.1	+0.05	+0.10	L+0.3 +0.10 L+0.1 +0.05 +0.10		
8	J.M.W.	M	36	R 20/15	+.25	R+0.5	+0.15	R+0.1	+0.10	+0.10	R+0.8 +0.20 R 0.0 0.0 +0.10	2½° / 21°	CORRECTED MEDIUM HYPEROPIA
				L 20/15	+.25	L+0.6	+0.15	L+0.4	+0.10	40.15	L+0.5 +0.15 L-0.3 -0.10 +0.05		
9	R.Mc.A.	M	21	R 20/15	+.50	R+1.4	+0.35	R+0.2	+0.05	+0.25	R+0.4 +0.10 R-0.6 -0.15 0.0	6½° / 9½°	NO GLASSES
				L 20/15	+.25	L+1.4	+0.35	L+0.7	+0.20	+0.30	L+0.4 +0.10 L-0.4 -0.10 0.0		
10	H.C.	M	29	R 20/30	+.25	R+6.0	+1.95	R+5.2	+1.65	+2.25	R+2.0 +0.55 R+1.3 +0.35 +0.40	8° / 6½°	NO GLASSES LATENT HYPEROPIA
				L 20/15	+.25	L+6.0	+1.95	L+3.5	+1.00	+1.50	L 0.0 0.0 L-0.8 -0.20 -0.10		
11	W.T.	M	25	R 20/15	+.25	R+1.9	+0.50	R+0.8	+0.20	+0.40	R+1.6 +0.40 R+0.7 +0.20 +0.30	3½° / 12°	UNDERCORRECTED MYOPIA (DURING TEST R-.75 L-.50)
				L 20/15	+.25	L+1.6	+0.40	L+0.2	+0.05	+0.25	L+1.3 +0.35 L+0.1 +0.05 +0.20		
12	L.H.	M	28	R 20/40	+.25	R+1.1	+0.30	R+1.0	+0.25	+0.27	R+2.5 +0.70 R+1.9 +0.50 +0.60	7° / 8°	PSEUDO MYOPIA SINCE ONE MONTH WEARS PLUS NO GLASSES DURING TEST
12a				L 20/40	+.25	L+2.1	+0.60	L+2.3	+0.65	+0.62	L+3.9 +1.15 L+2.4 +0.65 +0.80		
				R+3.5	+1.00	R+2.3	+0.65	+0.89					
				L+3.8	+1.10	L+2.3	+0.65	+0.87					
13	D.M.	M	18	R 20/15	+.25	R+5.5	+1.75	R+5.0	+1.55	+1.70	R+2.4 +0.10 R-0.9 -0.10 +0.05	7½° / 6½°	LATENT HYPEROPIA OU +1.00 NO GLASSES DURING TEST
				L 20/15	+.25	L+5.1	+1.60	L+4.0	+1.20	+1.40	L-0.4 -0.10 L-1.1 -0.25 -0.20		
14	B.T.	F	24	R 20/20	+.25	R+3.3	+1.00	R+2.3	+0.65	+0.80	R+0.3 +0.10 R 0.0 0.0 +0.05	11° / 16°	LATENT HYPEROPIA OU +.75 NO GLASSES DURING TEST
				L 20/20	+.25	L+2.4	+0.65	L+2.3	+0.65	+0.60	L-0.1 -0.05 L-0.1 -0.05 -0.05		
15	H.J.	M	18	R 20/15	+.25	R+0.7	+0.20	R-0.5	-0.10	+0.10	R-0.8 -0.20 R-1.7 -0.40 -0.30	7° / 11½°	LATENT HYPEROPIA NO GLASSES DURING TEST
				L 20/15	+.25	L-0.1	-0.05	L-1.3	-0.30	-0.20	L-1.0 -0.25 L-1.2 -0.30 -0.30		
16	E.M.	M	18	R 20/15	+.25	R+1.3	+0.35	R-0.1	-0.05	+0.30	R-0.6 -0.15 R-1.1 -0.25 -0.20	4° / 10°	L-ASTIGMATISM NO GLASSES DURING TEST
				L 20/20	+.62	L+1.4	+0.35	L-0.1	-0.05	+0.15	L-0.4 -0.10 L-1.4 -0.35 -0.20		
17	A.G.	M	17	R 20/15	+.25	R 0.0	0.0	R-2.0	-0.45	-0.29	R-1.5 -0.35 R-2.2 -0.50 -0.50	21¼° / 19°	NO GLASSES
				L 20/15	+.25	L-0.5	-0.15	L-1.9	-0.45	-0.30	L-1.8 -0.40 L-2.2 -0.50 -0.50		
18	W.H.	M	18	R 20/20	+.37	R+0.3	+0.10	R-0.5	-0.15	-0.05	R-1.9 -0.45 R-2.0 -0.45 -0.50	4½° / 7½°	NO GLASSES
				L 20/20	+.25	L-1.3	-0.30	L-1.4	-0.35	-0.30	L-3.1 -0.70 L-2.7 -0.60 -0.70		
19	H.K.	M	18	R 20/15	+.25	R+1.0	+0.25	R-1.1	-0.25	-0.05	R-2.3 -0.55 R-2.1 -0.50 -0.50	5½° / 9°	NO GLASSES
				L 20/15	+.25	L+1.2	+0.30	L+0.2	+0.05	+0.20	L-0.9 -0.10 L-0.7 -0.15 -0.15		
20	W.T.	F	18	R 20/15	+.62	R+1.4	-0.35	R-1.9	-0.45	-0.40	R-1.7 -0.40 R-2.9 -0.65 -0.50	8° / 18°	LATENT HYPEROPIA OU +.50 NO GLASSES DURING TEST
				L 20/15	+.37	L-0.4	-0.10	L-1.5	-0.35	-0.25	L-2.0 -0.45 L-3.5 -0.75 -0.60		
21	R.J.B.	M	30	R 20/15	+.25	R-1.0	-0.25	R-1.0	-0.25	-0.25	R-1.5 -0.35 R-1.2 -0.30 -0.30	26° / 22°	LATENT HYPEROPIC ASTIGMATISM
				L 20/15	+.25	L-0.9	-0.20	L-1.4	-0.35	-0.30	L-1.6 -0.35 L-2.0 -0.45 -0.40		
22	R.H.	M	24	R 20/20	+.25	R+1.7	+0.45	R+0.8	+0.20	+0.35	R+0.4 +0.10 R-0.4 -0.10 0.0	3° / 15°	LATENT HYPEROPIA NO GLASSES DURING TEST
				L 20/20	+.50	L+0.9	+0.25	L-1.4	-0.35	-0.10	L-1.5 -0.35 L-1.9 -0.45 -0.40		

quite considerably. The vision is gradually clearing up. During these tests he did not wear glasses and his visual acuity was still blurred

"20/40." When the first set of tests for accommodation was run, a creeping spasm was noticed, so the tests were continued until the spasm seemingly settled and the tests gave the second row of findings. This held true for the accommodation settings without fusion as well as for those with fusion.

Summing up our data for the accommodation settings, we then may say that the accommodation is not nearly as much stirred up by proximity of the test target as the convergence. The accommodation settings with fusion are possibly preferable to those without fusion. A final decision, however, cannot be reached with this group and so this investigation should be extended for some time and to other groups.

Finally we took the spectacle wearing subjects and made accommodation settings without glasses. In this particular case the setting should

SUBJECT	NAME	PRESCRIPTION	SEX	AGE	SETTINGS WITHOUT GLASSES: WITHOUT FUSION AV	SETTINGS WITHOUT GLASSES: APPROX. R_x	SETTINGS WITHOUT GLASSES: WITH FUSION AV	SETTINGS WITHOUT GLASSES: APPROX R_x	REMARKS
3	P.B.	R +1.50 L+1.75-.75ax180°	M	37	R-2.7 ⊕ L-1.7 ⊖	+0.75D 90°/180° +0.50D 180°	R-6.2 ⊕ L-6.4 ⊖	+2.00D 90°/180° +2.12D 180°	WEARS GLASSES CONSTANTLY
4	E.C.	R-3.00-1.50ax180° L-3.00-2.50ax180°	M	30	R+7.9 ⊖ L+7.8 ⊖	-2.90D 180° -2.85D 180°	R-7.4 ⊖ L-7.4 ⊖	-2.62D 180° -2.62D 180°	WEARS GLASSES CONSTANTLY
1	H.K.	R-4.00-1.50ax180° L-4.37-1.50ax165°	F	24	R+9.5 ⊖ L+9.6 ⊖	-3.87D 180° -3.90D 180°	R+9.0 ⊖ L+9.5 ⊖	-3.50D 180° -3.85D 180°	WEARS GLASSES CONSTANTLY
5	J.B.M.	R+1.50-.25ax90° L+1.25	M	24	R-5.80 ⊖ L-6.00 ⊕	+1.20D 90° +1.25D 90°/180°	R-6.9 ⊖ L-7.1 ⊕	+1.35D 90° +1.40D 90°/180°	WEARS GLASSES CONSTANTLY
7	R.F.	R+1.00-.25ax180° L+.37-.37ax 25°	M	25	R+0.3 ⊖ L+2.1 ⊖	-0.10D 180° -0.60D 180°	R-1.7 ⊖ L+0.3 ⊖	+0.50D 180° -0.10D 180°	WEARS GLASSES ONLY WHEN READING OR DRIVING

TEST DATA OF SPECTACLE WEARING SUBJECTS

TABLE III

Neumueller.

reflect the far point conditions of the patient. Where we had astigmatism and the patient's discrimination was fine enough to notice it, he or she was told to choose for report the line that becomes clear first when the target is moved in, which is also the line that blurs last when the target is moved out. These data are presented in table III. A survey of these data discloses that:

1. The approximate correction found by means of the stereoscopic card is comparable to that worn by the patient.

2. The settings with fusion are undoubtedly preferable to those without fusion giving higher plus values or less minus values.

In spite of these favorable factors we cannot yet recommend such a method for determining the ametropic error or even for screening out abnormal cases because the subjects of table III had worn their corrections for quite some time and their ocular habits and innervations were firmly established.

Summary

Our investigation seems to prove conclusively that phoria measurements by means of stereoscopic cards are unreliable. Whether or not ametropic measurements can be made by these means depends upon the results of further and more exhaustive investigations.

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WAR TIME OCULAR FIRST-AID

The United States has now entered into a period of active hostilities. Portions of our country have been actually under attack and segments of our civil population have been subjected to the inconveniences and the dangers which accompany modern warfare.

Optometrists living and practicing in such areas have been subjected to the same hardships as other civilians and have been forced to carry on their activities as other professional people do, by assisting their fellow citizens, whenever and wherever such aid is possible.

During air raids, for instance, injured citizenry turn for help to those of their fellow citizens who were fortunate in coming through

the attack unscathed. Thus in these critical moments of attack and in the immediate periods thereafter such help as can be rendered must and should be given to those who have been injured. In no sense can such immediate first-aid be construed to be the practicing of medicine. Each of these injured cases must be placed under the care of a physician as soon as possible, yet at times it is necessary for optometrists to lend their assistance in this vital humanitarian work.

To assist optometrists in their task of preparing for such emergencies the writer presents the following reviews of ocular first-aid procedures. These observations are presented only to encourage optometrists to further acquaint themselves with first-aid techniques which may prove invaluable in times of attack, when these come.

WAR TIME FIRST AID: OCULAR FOREIGN BODIES AND ABRASIONS

In dealing with first-aid emergency cases among the civil population, we as optometrists will probably find that foreign bodies constitute the largest single group of war time cases which may require attention. When such a case presents itself and no medical assistance is available, to which it can be referred, a few questions put to the patient will elicit information as to the probable cause and position of the foreign body.

To render first-aid in these cases the patient should be placed in good light and an inspection made of the anterior surface of the eye. In many simple cases the foreign body can be seen almost at once, and removal effected with a camel hair brush or sterile eye spud. Should the particle be very small it may be impossible to see it with the naked eye in which case the external ocular inspection should be carried out with the aid of focal illumination and a corneal loupe. At times the particle may be attached to the conjunctiva of the lids and to remove the foreign body the lid must then be everted. In more serious cases a thorough external inspection of the eye will probably disclose the foreign body or any damage done by it to the tissues of the eye, and at this stage the examiner should ask himself the following questions. (1) Is there a perforation of the globe? (2) Is the foreign body or bodies still present in the eye? (3) Is the foreign body adherent or embedded?

In cases in which the globe is perforated the patient should obviously be referred to a physician for medical attention and the same rule should apply if the foreign body is suspected to be deeply embedded. It is

imperative that this be done even if the examiner must send the patient from one town to another to get the proper ophthalmic surgical attention. However the experience of this war, in towns and cities of England has been, as the result of air raids, that much foreign material such as small parts of building stone and brick, mortar and general dust gets into the eyes of the civil population causing irritation and pain as well as lacrymation and photophobia. These latter cases can be given first-aid attention and relief in the absence of medical help, providing the foreign particle has penetrated to no great depth in the anterior tissues of the eye. In these cases the examiner should remove the foreign body, irrigate the anterior surface with an antiseptic solution and then refer the case to the nearest hospital or infirmary for further attention.

When the foreign body is superficial it can be removed by a blunt eye spud or with a little absorbent cotton wound around the end of a spud. The technique here being to brush or gently lift the foreign body from the anterior surface of the eye. In these cases no anaesthetics are, as a rule, necessary. When the foreign body is more firmly attached to the anterior surface of the eye, usually the cornea, it must then be lifted or dug out with a foreign body needle. In these cases the sterile needle is passed behind the foreign body which is then lifted out. In these cases the conjunctiva and the cornea should first be anaesthetized by instilling into the eye several drops of a 2 per cent solution of butyn. After the instillation of the butyn the eye should be kept closed for 45 seconds. Then the patient should open his eye for another 45 seconds to allow penetration. At the end of this one and one-half minute period the smarting due to the application of the drug will have disappeared, and the foreign body can be removed.

In these cases care must be taken, to inflict as little injury as possible, and not to perforate the cornea. The wound which results from this technique must be kept clean by means of frequent irrigation with a solution of boric acid. In some cases the use of bichloride ointment 1:3000 is also advisable, along with a protective eye patch and bandage.

In cases of ocular abrasions in which the eye is free from foreign bodies the same general rules apply for first-aid. If the globe of the eye is perforated; if the tension of the eye is diminished; if there is blood in the anterior chamber of the eye; or if the anterior chamber is very shallow; or if some part of the uveal tract may be found in the wound or projecting from it, the case requires surgical attention, and same

must be found for the patient at once. These are cases which are beyond the assistance of mere war time first-aid and every energy must be directed towards getting these cases into the hands of a physician skilled in ocular modalities. On the other hand, in the absence of a physician, cases showing superficial non-penetrating ocular abrasions can be given relief and perhaps freedom from infection by the frequent irrigation of the eye with boric acid and with the possible use of a bichloride ointment 1:3000. These war time wounds are frequently very painful and the eye should be bandaged and care taken to prevent infection.

WAR TIME FIRST-AID: OCULAR BURNS

In dealing with war time first-aid emergency cases among the civil population, we will probably find that burns of all character relating to the eye, constitute the second largest single group of cases which may require assistance. The largest group of war time cases, in the writer's judgment, will be those ocular cases in which foreign bodies or abrasions are present. The care for these cases has been mentioned. When a case of a burn presents itself and no medical assistance is available to which the case can be referred, a few questions put to the patient will elicit information as to the seriousness of the burn itself as well as its location either in the eye or on the surrounding skin tissue.

To render first-aid in these cases the patient should be placed in good light and an inspection made of the afflicted area. During military attacks upon towns and cities it must be remembered that burns are quite common. These are, as a rule, due to alkalies and acids, steam, boiling water, powder, hot metal and incendiary bombs. Burns may also be due during war periods to poison gas but this special type of burn will be mentioned later in this review. In a case of an ocular burn it is of the greatest importance to know the cause of the burn, if this information can be secured from the patient or from some witness to the occurrence. It is also of the greatest importance to do the proper thing for the patient, and if help is to be of value, in cases of severe burns, it must be applied as soon after the burn has occurred as possible.

Burns by caustics and acids are as a rule severe, and, when more than mere superficial conjunctival irritations, are apt to also injure the cornea and result in most serious eye complications. In working with war time injury cases, our only possible duty can be to render whatever immediate first-aid assistance is possible and then get the patient into

the hands of an eye surgeon irrespective of time or distance to be traveled to accomplish this.

From the first-aid standpoint the eye with an alkali or acid burn should be thoroughly washed free from the corrosive as soon as possible with neutralizing solutions if available. For an alkali burn use a weak acid, such as a solution of boric acid, 10 grains to the fluid ounce of water. The entire conjunctival sac must be irrigated time and again to remove entirely the effects of the alkali. For an acid burn use a weak solution of sodium bicarbonate, also 10 grains to the fluid ounce of water and irrigate until the eye is entirely free from acid. The important thing to remember is to at once remove the destructive agent, and if you do not know the name of this agent or the cause of the alkali or acid burn, then irrigate the eye or eyes with large quantities of sterile warm water. At the same time preparing the patient to be removed to a suitable hospital where proper attention can be given.

In cases in which the conjunctival surfaces have been burned with steam or boiling water, medicated castor-oil or medicated olive oil may be instilled into the conjunctival sac to give the patient some relief while getting him into the hands of a physician.

Powder burns require somewhat different emergency care. Here, as a war time first-aid measure the eye should first be anaesthetized with a 2 per cent solution of butyn and the powder-grains removed with an eye spud. After this has been accomplished the eye should be irrigated with boric acid solution and the case sent to a hospital for further attention.

In cases of non-perforating ocular burns due to hot metal, the metal must be removed if still present and then either medicated castor-oil or medicated olive oil injected into the cul-de-sac. In all cases of war time ocular burns the examiner's only duty is to render first-aid and to then see to it that the patient is quickly given the needed medical attention which will save remaining vision.

In cases of burns involving the surrounding skin tissue of the eye, the involved area may be gently cleansed with absorbent cotton soaked in medicated oil. After this is finished the area may then be covered with gauze upon which has been placed a thick coating of vaseline. These cases, like the others, should then be referred to medical centers for additional help and future treatment.

WAR TIME FIRST-AID: POISON GAS

In dealing with war time first-aid emergency cases among the civil population, we may find that the effects of poison gas, as these relate to the eye, play but a small part in the aggregate work of this kind to be done. During the first 26 months of the current invasion of England, poison gas has been used but sparingly. From an ocular standpoint, we find the civil population suffering principally from the effects of foreign bodies in the eye and burns. In the World War of 1914-1918, however, events proved that during the latter portion of the struggle that poison gas was widely used with serious effects upon not only the troops engaged in service but also upon the civil population. As we have no assurance that poison gas will not again play a part in the present war, we should be familiar with these products, their effects upon the eye and the first-aid emergency measures which should be employed to relieve these effects.

According to Burnley[1] practically all of the recognized war gases affect the eyes, and optometrists should make it their business to know something about the first-aid treatment of such casualties. This view is also held by Moss,[2] who also points out that while we have only the experiences of the World War to guide us, that these should be sufficient to cause us to become familiar with the effects of poison gas upon the eye.

Let us first consider the nature and properties of poison gases as used by military forces. Gas Warfare or Chemical Warfare are the names applied to the use of any chemical substance calculated to do harm to the human body. Some of these substances are true gases in the chemical sense, while others are minute suspended particles of solids resembling clouds of smoke.

Poison gases as used by military forces may be divided into two groups from the standpoint of their effective staying powers. Gases which tend to diffuse by mixing with air and thus becoming less dangerous are termed non-persistent gases. Gases which are used in liquid form and which when deposited upon the ground evaporate but slowly and thus retain much of their effectiveness are called persistent gases. The

1. Sydney Burnley. First-Aid for Gas Casualties. The Optician. (London, England) Vol. XCVIII, No. 2540, p. 281, 1940.
2. Comptom Moss. Hints on First-Aid for Eye Injuries. The Optician. (London, England) Vol. XCIX, No. 2569, p. 329, 1940.

most common non-persistent military gas is known as chlorine gas, while the best known persistent military gas is mustard gas.

Gases may also be classified by their effects upon the body, and it is by that grouping that we shall consider them in this report. Keeping in mind at all times the staying quality or effective power of the gas under consideration.

Tear Gas

All tear gases are made to immediately affect the eyes. The purpose of these gases is not so much to permanently destroy vision, but rather to disable, for various periods, those persons coming into contact with the gas. There are four important gases employed as military tear gas. These are, (1) Chloro-aceto-phenone, which is itself a solid, which in turn is soluble in organic solvents. This is the form of tear gas usually employed by police departments to quell riots, etc. It is a non-persistent gas. (2) Ethyl-iodo-acetate, a dark brown oily liquid possessing a low vapor pressure. This is a persistent gas, and (3) Bromo-benzyl-cyanide, a yellow, very heavy oily liquid also possessing a low vapor pressure. This too is a persistent gas, $C_6H_5.CH_2BrCN$. Among the tear gases should also be mentioned the military sternutatories or sneeze-producing substances, for example, (4) Diphenylchlorarsine, $(C_6H_5)_2AsCl$. There are of course a number of other chemical compositions more or less similar to the above and having similar effects upon the eyes, but those mentioned are actively used by military forces.

Tear gases have an immediate action upon the eyes even in low concentrations. The sensory nerve endings of the conjunctiva and corneal regions of the eye are affected. The patient at the same time suffering irritation and pain in accordance with the concentration of the gas. In these cases tears flow incessantly and the patient finds it impossible to keep the eyes open.

The first-aid treatment of most of these cases is very simple. The patient should be removed from the affected area and the eyes washed out thoroughly with warm water. The ocular effects of this condition are as a rule but temporary and the majority of these patients do not need to be hospitalized. The use of a respirator or gas mask, by the civil population, will eliminate the risk of tear gas affecting the ocular tissues.

Irritant Gases

Unlike tear gases, the irritant gases included in this group are gases which are prone to cause serious damage. In some patients even proving fatal. The first of these is chlorine gas, which during the World War was used to drive back armies. In its military form it is very poisonous and always considered a deadly gas. It is easily recognized by its greenish-yellow color and its extremely irritating odor, an odor of chloride of lime. The second irritant poisonous compound used extensively in military operations is made from chlorine and is called phosgene gas, $COCl_2$. This is a colorless gas upon release and has the odor of musty hay. Both of these are true gases and are non-persistent, though deadly.

Patients coming in contact with either of these gases feel an immediate irritation of the breathing passages, a tightness of the chest, usually accompanied by coughing and a blueness of the face. The pulse rate increases and nausea may accompany the other symptoms. The eyes water and become congested. These however are but the early symptoms. The later symptoms include water on the lungs and acute coughing.

From an optometric standpoint there is little first-aid the optometrist can render for these patients. They must first be removed from the affected area and should be supplied with a gas mask at once, before even this is attempted. The optometrist should remember that these patients are always stretcher cases. They should be permitted no exertion and should be wrapped in blankets and kept warm while they are being removed to a hospital.

Blister Gas

The gases mentioned in this group differ from the preceding gases inasmuch as these gases affect the entire body. Not only the eyes as in the case of tear gas, or the lungs as in the case of the irritant chlorine gas. Blister gases affect the internal and external tissues of the entire body and cause much serious discomfort in all cases and even becoming fatal in some.

The two most common forms of military blister gases are, first, mustard gas or dichloro-diethylsulphide $(Cl.C_2H_4)_2S$.* This gas is a

*The dot is used here to separate two distinct substances in the compound, Cl and C_2H_4.

heavy, oily dark brown liquid having a faint odor of mustard and garlic. The second form of blister gas is lewisite gas or chloro-vinyl-dichlor-arsine. This is a colorless heavy oily liquid which smells somewhat of geraniums. Both of these gases are of the persistent type, possessing poor vaporizing properties at normal outdoor temperatures. Both of these gases have great penetrating power and being of an oily nature, readily soak into most clothing materials thus attacking the skin at any point. As has been said, they attack any and all parts of the body in an insidious manner inasmuch as they are hard to detect either visually or through their odor. Both function by delayed action, and each are used by the military forces in solid, liquid and vapor forms.

According to the physician Sorsby,[3] the early ocular injuries produced by mustard gas during the World War seemed chiefly of a minor and transient character. Approximately 75 per cent of the cases evidenced a mild conjunctivitis at the start with no apparent damage to the cornea. In some 15 per cent of the cases the conjunctivitis was more intense and in the remaining 10 per cent there was a corneal lesion. As the effect of the mustard or blister gas depends on the concentration that reaches the eye, he concludes that as the methods of distribution have improved in recent years, it is therefore logical to expect that the proportion of severe to mild injuries are likely to be higher in the future. The physician Phillips.[4] however, points out that a great number of the same cases developed delayed keratitis in future years, many of them loosing all or nearly all useful vision. Authorities seem to differ as to the outcome of these ocular burns but all agree that early irrigation is of the greatest importance in patients exposed to blister gas in any form.

As far as the eyes are concerned, several hours after exposure to vaporized blister gas the initial symptoms appear. The patient will complain of his eyes feeling sore and the conjunctiva will appear irritated. A photophobia will gradually develop and after about 12 hours from the time of exposure the lids will become swollen and a purulent discharge will be observed. Should the eyes come in contact with the liquid form of blister gas the symptoms would be the same but of a much more immediate and severe character.

In these cases where no physician is immediately available the

3. Arnold Sorsby. Ophthalmic Service to the Civil Population in National Emergency. British Medical Journal. September 23, 1939.

4. T. J. Phillips. Gas Injuries to the Eyes. British Medical Journal. February 2, 1940.

optometrist can render some useful emergency first-aid service. While there seems to be some doubt as to the ability of any one to successfully treat a case in which blister gas has entered the eye either in liquid or vapor form, it is known that if these cases are to be helped at all, whatever help is given, must be administered at the earliest possible moment after exposure. Obviously, the optometrist has two duties to perform for these patients. First, to irrigate the anterior surface of the eye very thoroughly with warm water or a saline solution and second, to arrange to have the patient hospitalized as soon as possible.

SUMMARY

During this war period, in times of attack it will be necessary for optometrists to assist in rendering ocular first-aid. Procedures to be followed in cases of ocular foreign bodies, burns and poison gas are briefly reviewed. These reviews are presented only to encourage optometrists of America to further acquaint themselves with first-aid techniques which may prove invaluable in times of attack. It is understood that the optometrist is rendering first-aid, and not medical treatment. That each of the injured cases must be placed under the care of a physician as soon as possible.

Carel C. Koch.

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

by J. Fred Andreae, Secretary

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

HIGHLIGHTS OF ACADEMY MEETING

The Academy held its annual meeting in Chicago, December 7, 8 and 9, 1941. Those Fellows unable to attend will want to know a few of the highlights and read a few of the highspots of the meeting. The following brief running account gives just that. In future issues we will present the more formal reports of officers and Academy Committees.

What a joy it was to again meet and fraternize with those optometrists you had not seen for a year—some even longer. Both the regular

and informal sessions were especially enjoyable. One Fellow who has been unable to participate for some time was with us again and certainly seemed to have a fine time. I refer to Dr. Albert Fitch, who has regained his normal vision after a successful double cataract operation and was able to take full and active part in the proceedings of the annual meeting.

A story was told on one of our prominent Fellows. On the way to Chicago, he alighted from the train at each station and generally just managed to get back aboard. A fellow passenger finally could not restrain his curiosity and asked him, "Why he got on and off the train so often?" This Fellow replied, "My physician has told me that my heart condition is such that I may drop off any minute and I am not taking any chances—I am buying my ticket from station to station."

As one "columnist" to some other columnists: It was a pleasure to have most of the Topaz family with us at the formal dinner on Monday evening.

Our genial and indefatigable editor, Fellow Carel C. Koch, was everywhere. He was in charge of publicity for the meeting and did an excellent job. The one "fly-in-the-ointment" was the attack by Japan on Sunday, December 7th. I am sure the Academy would have made the "front-page" on that day, too, had this attack not occurred.

The Examination Committee, consisting of Fellows, R. M. Hall, M. T. Eberl and O. J. Melvin, were busy on Friday and Saturday before the meeting. They conducted examinations for Fellowship at the Northern Illinois College. Six candidates were examined.

The formal dinner met every expectation. The guest speaker, Dr. Felix Held, was exceptional. He had the rare gift of mixing humor and horse-sense. Dr. Held is a member of the faculty of Ohio State University and if his actions before our group can be taken as a criterion, I for one would like to have him for my "prexy."

Fellow William B. Needles, and his son, Dr. Richard Needles, deserve our thanks for their many contributions to the success of our meetings.

President Wheelock gave a good account of himself as a presiding officer—in fact, so good that he was unanimously re-elected for another year.

Program Chairman, Dan Hummel was unable to attend due to the

serious illness of his wife. He delegated another Clevelander, Fellow A. J. Rowe to pinch-hit for him and it was a perfect selection. Dr. Rowe was on the job every minute and the proceedings never lagged for a single moment. The papers delivered at the meeting will be published in these Archives, from time to time, this year.

The Nominating Committee, consisting of Fellows Charles Van Sluyters, Herman Shurin and Robert J. Beitel, Jr., brought in the following slate of officers for 1942. For President, Dr. Arthur P. Wheelock, of Des Moines. For Vice President, Dr. Curtis R. Wells, of Boston. For Secretary, Dr. J. Fred Andreae, of Baltimore. For Councilmen, Dr. Glenn Winslow of Los Angeles, Dr. William Greenspoon of Bluefield, Dr. W. Edward Dewey of Battle Creek, and Dr. Harold M. Fisher of New York City. There were no other nominations and these officers were unanimously elected.

The committee in charge of selecting the next meeting place and the dates therefore consisted of Fellows Clyde Hathaway, O. H. Johnson and Frank Tibbetts. In view of the small number of Fellows present at the final business session, when this matter was brought up, it was voted to decide these questions by a mail vote of the entire membership. Fellows George Keevil and Frank Ottoway joined in presenting an invitation from Toronto, Canada. Fellow Albert Fitch presented an invitation to come to Philadelphia.

Of the many technical papers which were presented, all were excellent and all will appear in these pages. Most of the time of these meetings is given over to these scientific reports and the discussion which follows each. All meetings were well attended, with each speaker having a large audience.

As these lines are written, the Academy is finishing the year 1941 in fine shape. As its Secretary, I wish you all a very Happy New Year and in addition can assure you that this organization will continue its progress for an ever finer and better optometry.

PROCEDURE AND INSTRUMENTATION

by Guy L. DuPlessis

A department wherein discussions will be carried on relative to the value of various experimental and clinical techniques as employed by practicing optometrists, and also in which the instruments used by optometrists in various phases of their work, will be subjected to some critical evaluation.

A SIMPLE AMBLYOSCOPE FOR HOME USE

Various orthoptic devices have been supplied to patients for use at home to supplant and increase the effectiveness of office orthoptic training. One instrument of considerable value is the Worth-Black Amblyoscope. This is seldom used for home training because of its comparatively high cost. The Worth-Black amblyoscope permits the positioning of monocular targets to correspond to the line of regard in strabismic cases and the illumination of each target can be regulated to stimulate fusional perception in the amblyopic eye. The simplicity of the instrument permits its use by the patient at home, but its cost makes its use uncommon.

As a substitute for the amblyoscope, Dr. Mathew B. Alpern[1] suggests the use of two paper mailing tubes, each one inch in diameter and each from three to four inches in length. These tubes are to be used without an optical system. The distal end of each tube is covered by a cap in which an aperture of about ¼ inch in diameter is made. The aperture of one tube is covered with green cellophane, the other with red. The nearness of the aperture acting as a fixation object and its comparatively large size precluding accommodative effort.

Alpern suggests that these tubes be held by the patient before his eyes, as is the amblyoscope, and moved in accordance with previously given instructions. The use of complementary colors also inhibits accommodation without making first degree fusion impossible. The writer believes the lack of prisms or mirrors might, however, prevent the positioning of the tubes for high converging angles. It might be well to use base-out prisms to approximate the minimal angle of convergence.

As a further suggestion the light control advantage of the Worth-Black amblyoscope can be roughly duplicated by positioning the patient with a light shining strongest on the target of the amblyopic eye and by the use of a shield or shade on the cap of the non-amblyopic eye.

A difficult part of strabismic training is the securing and development of first degree fusion. In selected cases approximation of the lines

1. Alpern, M. B. Simplified Amblyoscope for Home Orthoptics. Optometric Weekly. 32. 32. 910-912. 1941.

of regard and persistence, eventually produce simultaneous binocular perception. This simple device of Alpern might facilitate the work, particularly on an intelligent and cooperative patient.

THE ORTHO-FUSOR

The *Bausch and Lomb Company* has announced the presentation of the "Ortho-Fusor" to the professions as a new method of fusional training to develop and increase the quality of relief perception. Methods generally used for this purpose are the stereoscope, a device requiring the use of stereoscopic views; by using photographs of varying stereoscopic parallax, the degree of fusion is tested or stimulated. Another method is to employ anaglyphs, dissimilar images of complementary colors so that each eye sees only one image and the combined images produce an illusion of depth. A third method, of more experimental type and use, is the rapid alternate presentation of polarized images seen through polarized spectacles. The persistence of visual impressions in each eye produces the illusion of depth in the fused images. This method has been experimented on recently for tri-dimensional moving pictures.

The Ortho-Fusor consists of polaroid vectographs viewed through polaroid spectacles. Vectograph pictures are printed on transparent sheets of polaroid material and to the naked eye appear flat and fuzzy as a bad example of printing, but when viewed through polaroid spectacles with the proper angle of polarization the parallactic angle of the two prints produce full depth perception.

This new use of polaroid materials offers possibilities for home training of stereopsis by means of graded photographs and polaroid glasses. Stereoscopic training in the home can be made as interesting to the patient as the reading of a picture magazine.

ABSTRACTS

A department in which will appear abstracts of the literature of optometry, ophthalmology and applied optics. These will be classified according to the following list, although contributions to all sections will not necessarily appear in each issue.

1. Ocular Refraction.
2. Physiological Optics and Color Vision.
3. Ocular Muscles.
4. Orthoptics and Reading.
5. Anatomy, Histology and Embryology.
6. Ocular and General Pathology.
7. Ophthalmic Lenses and Material.
8. Instruments.
9. Hygiene and Illumination.
10. Applied and Physical Optics.
11. Education, Sociology and Economics.
12. Miscellaneous.

1. OCULAR REFRACTION

REFRACTION IN APHAKIA. Wolfe, H. L. Journal of the American Optometric Association. 1941, 8, 2, 72-74.

Ten days following the surgical removal of a lens Wolfe finds that approximately 85 per cent of the aphakic eyes will accept with comfort a +10.50 D. Sphere ⌒ +2.50 D. Cyl. axis 180. This or some similar formula is then prescribed for temporary wear and the detailed examination and refraction is made at a somewhat later date when the eye has entirely recovered from the surgery.—C.C.K.

PRISM CONTROL OF ANISOMETROPIA. Crundall, E. J. Optician (London). 1941, 101, 2622, 311-312.

The vertical prismatic displacement of anisometropic corrections is discussed by Crundall who describes the slab-off prismatic lens used to offset the displacement caused by the unequal correction. These slab-off prismatic lenses are new to British optometrists.—C.C.K.

NEAR-POINT CORRECTIONS FROM 14B FINDINGS. Fry, G. A. Canadian Optometrist. 1941, 2, 12, 373-375.

Fry points out that Dr. S. K. Lesser's method of computing a near-point correction from the fused cross cylinder finding is shown to be based on unsound theoretical principles except in cases of absolute presbyopia. A simplified method is presented by Fry for computing the near-point correction which gives the same result as the series of mathematical steps involved in Lesser's method of making the computation. The data presented by Fry shows that gross statistical averages do justify Lesser's computation of a near-point correction from the 14B and 15B findings, but the rule cannot be applied to all individual cases.—T.O.B.

CYCLOPLEGIC FINDINGS: SEEING PROBLEMS OF SCHOOL CHILDREN. Part 20. Betts, E. A., and Austin, A. S. Optometric Weekly. 1941, 32, 11, 285-286.

"The chief purpose of this phase of the investigation was to study the relationship between cycloplegic and manifest findings." The authors come to several conclusions. First, that neither cycloplegic nor manifest findings constitute an adequate appraisal of the seeing functions because of the desirability of taking into consideration other visual data which provide indexes to binocular functions. And, second, they found that (1) no additional intra-ocular pathology was determined while making cycloplegic eye examinations. (2) That no case examined by them accepted minus sphere during the manifest examination and plus sphere during the cycloplegic examination. (3) In general, there was a high relationship between the cycloplegic and manifest findings, and (4) the cycloplegic findings tended to be higher than the manifest findings during the static skiametric part of the examinations.—C.C.K.

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2. PHYSIOLOGICAL OPTICS AND COLOR VISION.

THE REFRACTION OF VARIOUS SPECTRAL QUALITIES OF LIGHT BY THE HUMAN EYE. Luckiesh, M., and Moss, F. K. Journal of the Optical Society of America. 1941, 31, 595-597.

The refracting power of normal eyes (two subjects) under tungsten filament light and various qualities of light from fluorescent lamps was determined for fixation distances of 16 inches and 20 feet, respectively. The method involved the use of the Luckiesh-Moss ophthalmic sensitometer (described in Archives of Ophthalmology, 1940, 23, 941). Taking the refractive state of the eye under tungsten filament light as a base for determining the dioptric displacement of the point of focus under lights of various spectral characters provided by fluorescent lamps (an assumption in accord with ophthalmic practice), the data reveal that the differences in spectral quality of the various lamps produce only small differences in focus. This may be attributed to the fact that the "light from present fluorescent lamps is far from monochromatic in character since the chromatic difference in focus for the extremes of the visible spectrum is of the order of two diopters." The significance of such information with respect to the consideration of accommodation—convergence relationship in certain lighting situations involving the use of colored light produced by fluorescent lamps is pointed out.—R.J.B.

FUSIONAL MOVEMENTS IN PERMANENT STRABISMUS: A STUDY OF THE ROLE OF THE CENTRAL AND PERIPHERAL REGIONS IN THE ACT OF BINOCULAR VISION IN SQUINT. Burian, H. M. Archives of Ophthalmology, 1941, 26, 626-652.

"A projection method for the examination of the binocular cooperation of patients with permanent strabismus is described. About 75 selected patients with permanent horizontal deviation as great as 12 arc degrees and with good vision in each eye were examined. None of these patients had normal binocular vision, but a large number of them followed peripheral fusional stimuli. It could be demonstrated that patients in whom peripheral fusional stimuli were effective showed as a rule, a sensorial disturbance (suppression or change in the mode of localization or in the angle of squint) when the two foveas were stimulated simultaneously; patients who did not follow peripheral fusional stimuli usually did not show a sensorial disturbance of the central parts of the retinas but suppressed the images of one retinal periphery. Different types of cases are reported, and the implications are discussed which the findings have for the understanding of the act of binocular vision and the visual act of squint."—R.J.B.

A METHOD OF SCALING VISUAL CHARTS. Waldman, S. A. Mid-West Optometric Journal. 1941, 8, 11, 14.

This paper reviews in part the work done in 1925 by Mr. Scott Sterling and Dr. Albert Snell in developing formulas to determine visual efficiency.—C.C.K.

THE RETINAL MECHANISM OF COLOR RECEPTION. Granit, R. Journal of the Optical Society of America, 1941, 31, 570-580.

Granit reviews the analysis of color reception as undertaken with the aid of electrophysiological methods. These methods involve the insertion of microelectrodes into the retina to record the discharge of impulses from single or a restricted number of elements in response to illumination with a spectrum of known energy distribution. From the electrodes leads are taken to an amplifier, cathode ray oscillograph and loudspeaker. In this manner it has been possible to obtain curves showing the distribution of sensitivity to spectral light of active elements in the eyes

of mammals, amphibians, and fishes. The results support Thomas Young's conception that the retina possesses elements sensitive to different regions of the spectrum. A number of other results illustrate some fundamental properties of the mechanism of color reception.—R.J.B.

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3. OCULAR MUSCLES.

OCULAR PARALYSIS. Gibson, H. W. Optician. (London), 1941, 102, 2636, 113-115.

Unequal primary and secondary deviations; limitations of movement; the type and character of false orientation; and the amount of diplopia found present, are of diagnostic value in making a determination of the muscle or muscles involved, when a paralysis of one or more of the extra ocular muscles is present. Full descriptions of the diagnostic techniques are given.—C.C.K.

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4. ORTHOPTICS AND READING.

THE ORTHOPTIC TREATMENT OF STRABISMUS IN RATIONAL PERSPECTIVE. Cholerton, M. Dioptric Review and British Journal of Physiological Optics. (London), 1941, (New Series), 2, 2, 129-136.

"In cases of long standing in which secondary correspondences and changes are established, or where the experience of fusion by reason of the early intervention of the squint preventing primatial development is not capable of reconstruction, it is useless to humbug the case with the doubtful and illusory benefits of orthoptic treatment, unless it can be wielded to pierce a chink in the armour of the vicious circle of binocular perversion." The orthoptic treatment of squint requires a high knowledge of visual processes, refraction, neurology and pathology and the author emphatically rejects fixed or set routine treatment procedures for squint cases. Each case which is to be treated must be individually studied and no two cases of squint can be treated in like manner.—C.C.K.

WHAT CAN BE EXPECTED OF ORTHOPTIC TRAINING? Knauber, E. American Journal of Ophthalmology, 1941 (Sept.), 24, 1022-1025.

From her experience at the Manhattan Eye, Ear, and Throat Hos-

pital Orthoptic Clinic where the yearly average is 6,000 patient visits, the author draws the following conclusions. Orthoptic training can be expected to serve as the means for improving amblyopia, exanopsia, heterotropia and heterophoria. As an aid to surgery, orthoptic training furnishes the method for study of the fusion status and grade of binocular vision. Correction of faulty correspondence can be accomplished in many cases and is an essential reason for pre-operative training. Pre-operative training of fusion, fusion range and accommodation-convergence relationship facilitates post-operative recovery of normal binocular performance. In heterophoria, with asthenopic symptoms, orthoptic training will produce most satisfactory results. Few people can obtain results from a self-administered program of vergence exercises. With orthoptic training the patient is under specific direction and guidance. In cases of phoria with either convergence insufficienty or divergence insufficiency, unstable fixation is often present. Orthoptic training results in improved fixation, relief from symptoms and improved visual ability. Ophthalmograph films taken before and after treatment clearly show improvement obtained. Psychologically, the adult reacts as does the child to the stimulus of knowledge of achievement.—R.J.B.

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6. OCULAR AND GENERAL PATHOLOGY

DEEP CUPPING OF NERVE HEAD IN ATROPHY OF OPTIC NERVE DUE TO METHYL ALCOHOL: COMPLICATED BY AMBLYOPIA DUE TO TOBACCO AND ETHYL ALCOHOL. Friedman, B. Archives of Ophthalmology, 1941 (July), 26, 6-11.

"A few of the patients who survive methyl alcohol poisoning subsequently have a type of atrophy of the optic nerve which is accompanied with deep cupping of the disk. The fundus picture is so similar to that associated with glaucoma that when the condition is encountered in practice a great deal of proof is required before deciding against a diagnosis of glaucoma." A case is reported showing a complication of tobacco —alcohol superimposed upon an atrophy of the optic nerve of 22 years standing. Prompt and spectacular recovery followed the use of vasodilators and the vitamin B complex.—R.J.B.

OCULAR CHANGES IN GOITRE. Reiley, P. L. Optical Journal and Review of Optometry, 1941, 78, 3, 20.

In this case report the author presents data having to do with a four year period in the life of a patient starting at age 35. This patient developed a toxic goitre for which he received surgical assistance during the third year of this four year period. The author, in chronological order, presents the patient's ocular symptoms, visual acuity, refractive findings and heterophoria findings; these data recorded during a number of visits made before the onset of the goitre, during the period of incidence, at the time of the surgery and during the period of convalescence. —C.C.K.

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7. OPHTHALMIC LENSES AND MATERIAL.

THE OPHTHALMIC LENS. Tillyer, E. D., and Boeder, P. Optical Journal and Review of Optometry, 1941, 78, 2, 36.

This paper presents an historical review of ophthalmic lens making, with emphasis on the developments in this field from the time of Prentice to the present day corrected curves.—C.C.K.

A NEW SUN GLASS LENS. Unger, M. Optical Journal and Review of Optometry. 1941, LXXVIII, 15, 32.

Unger describes a new protection lens which is composed of a transparent colored peripheral portion and a clear transparent central portion. The clear and colored portions are fused together to form a single blank and then ground so that the colored glass is entirely removed from the central area of the glass.—C.C.K.

CONTACT LENS SOLUTION EVER-PRESENT PROBLEM. Pascal, J. I. Western Optical World. 1941, 29, 10, 391.

It was found, that an ordinary well fitting contact lens, filled originally with brilliant cresyl blue solution, and applied to the eye, loses the blue color behind the lens in about 15 to 20 minutes. Cresyl blue is known not to change its color by contact with tears or ocular tissue, and the disappearance of the blue solution can mean only one thing, and that is, that it has been replaced by tear fluid. In spite of the title of this article Pascal seems to doubt if the solution used within the contact lens plays an important part in the comfort with which the device is worn.—C.C.K.

DEVELOPMENT OF MOULDED PLASTIC CONTACT LENSES. Anderson, E. Canadian Optometrist. 1941, 2, 12, 363-364.

The Feinbloom contact lens uses a plastic base to go in contact with the sclera while using optical glass fused to this base to provide the refracting surface. The Oberig contact lens is entirely made in one piece from molded plastics having a refracting surface ground to provide the needed refractive correction. Techniques used in fitting contact lenses are mentioned.—C.C.K.

PLASTIC AND PLASTIC LENSES. Emsley, H. H. Optician (London). 1941, 102, 2637, 127-130.

Under the trade-name "Igardi," plastic ophthalmic lenses are now being dispensed in England. These are made from a polymerised form of methylmethacrylate, a derivative of acrylic acid. The principal raw materials used in their preparation are acetone, methanol and hydrocyanic acid. According to Emsley, these plastic lenses have a very low absorption quality for both the ultra-violet, the infra-red and the visible spectrum. Tables are presented showing the various properties of these lenses as compared with lenses made from ophthalmic glass.—C.C.K.

Current Comments by Carel C. Koch

A Monthly Department

in which the Editor of the AMERICAN JOURNAL OF OPTOMETRY & ARCHIVES OF THE AMERICAN ACADEMY OF OPTOMETRY will discuss items of news of general interest: such as relate to new instruments, clinical techniques, education, public health, and optometric legislative and organization problems.

OPTOMETRISTS AND THE FIFTH FREEDOM— "THE RIGHT TO WORK"

In these war times, most optometrists, we believe, recognize that the welfare and safety of American citizens depend, in a large measure, upon the whole-hearted production of those things required for national defense. They further realize that to accomplish this end, there must be a general willingness to make sacrifices and a spirit of unity among all peoples.

"Such unity of purpose and action," says Mr. Albert W. Hawkes,[1]

1. Hawkes, Albert W. The Right to Work. Washington Review, 9, 4, 1941.

President of the Chamber of Commerce of the United States, "involves not only management and labor, but all American citizens. We hold," he says, "that the right to work or refuse to work is one of our great freedoms, to preserve which right the nation is arming itself. Governments—local, state and federal—have a duty and responsibility to protect the citizens in this right to work—while at work—on their way to and from work—in their homes and in all ordinary legal pursuits of their private life."

President Hawkes also points out, "We believe in the right of an individual to refuse to work and the right of a group to strike. But under our present national emergency, we deplore any such action based upon an unreasonable demand or a debatable cause." He further says, "No right guaranteed to the individual under our Constitution is more sacred and fundamentally important than the right of an individual to work and earn a living. This right exists whether he belongs to a union or does not belong to a union. It is a FIFTH FREEDOM—quite as important as any of the freedoms, including the four freedoms of worship, speech, the press and assembly."

He concludes by saying, "We firmly hold if our established form of governments is to endure, it must not permit or assist any group of its citizens to force others to surrender their guaranteed rights and freedoms."

To this doctrine we most heartily agree. To be sure, President Hawkes was talking about production lines and labor problems, while we as optometrists are referring to an intra-professional dispute which, if continued, may seriously affect the health of this nation—but the principles are the same.

As a professional group of American citizens we are pledged to do our part in preserving the American freedoms and the democratic ways of life, and we are all willing to make sacrifices for this cause.

We do protest, however, at the arbitrary refusal of the war department in Washington to utilize the services of optometrists as refractionists in the U. S. Army. A technical service for which they are admirably trained and in every sense qualified. We believe the position taken by the War department is now harmful to our great American cause, as today the optometrists are the best trained refractionists on the ground to now serve the troops.

We also protest the unreasonable action of certain (though few) welfare officials in attempting to deny the same right of an optometrist

to engage in public welfare work, as this pertains to the rehabilitation of the civil population.

Today optometrists are willing to make sacrifices—but we feel we would be derelict in our duty if we did not point out the danger in permitting a public policy to be continued which is based only on the untenable grounds of intra-professional antagonisms.

Optometrists have, for generations, proven their qualifications as ocular refractionists. No one doubts their ability in their chosen professional field. The civil population is well served by them—and the U. S. Navy has accorded them the professional recognition which is theirs. As a group, optometrists are willing to serve their country and do their duty as professional men. Why, therefore, does this strange attitude prevail in army medical circles and in some few welfare groups? Certainly such action is based upon a debatable cause, and certainly such action violates the right which admittedly exists for optometrists to work and serve.

We are aware that an intra-professional relations committee is working on this problem. We hope nothing in the way of economic jealousies is permitted to further retard its proper solution, as the welfare of our country must now come before professional prejudice.

However, now is the time for optometrists to assert their rights in this FIFTH FREEDOM. *Their* right to work and serve *their* country in the manner they are best qualified to serve—and that is as professional men, doing the job they are trained to do—the making of ocular examinations and the correction of visual disorders.

It is therefore pleasing to learn that the American Optometric Association has decided to now take important steps to assist in securing for optometry the recognition it seeks which when gained, will enable all optometrists to best serve their country.

To assist the American Optometric Association during this war period, funds are necessary. Optometrists everywhere are urged to support their national association in the emergency campaign now under way. Their plans when fully matured, will do much in the way of assuring the optometrist of his right to work. We have the pledge of the present officers of the American Optometric Association that every effort will be made to secure for our profession the justice which is ours. This pledge calls for our fullest cooperation and most hearty support.

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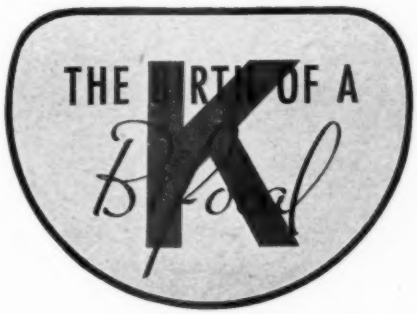

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